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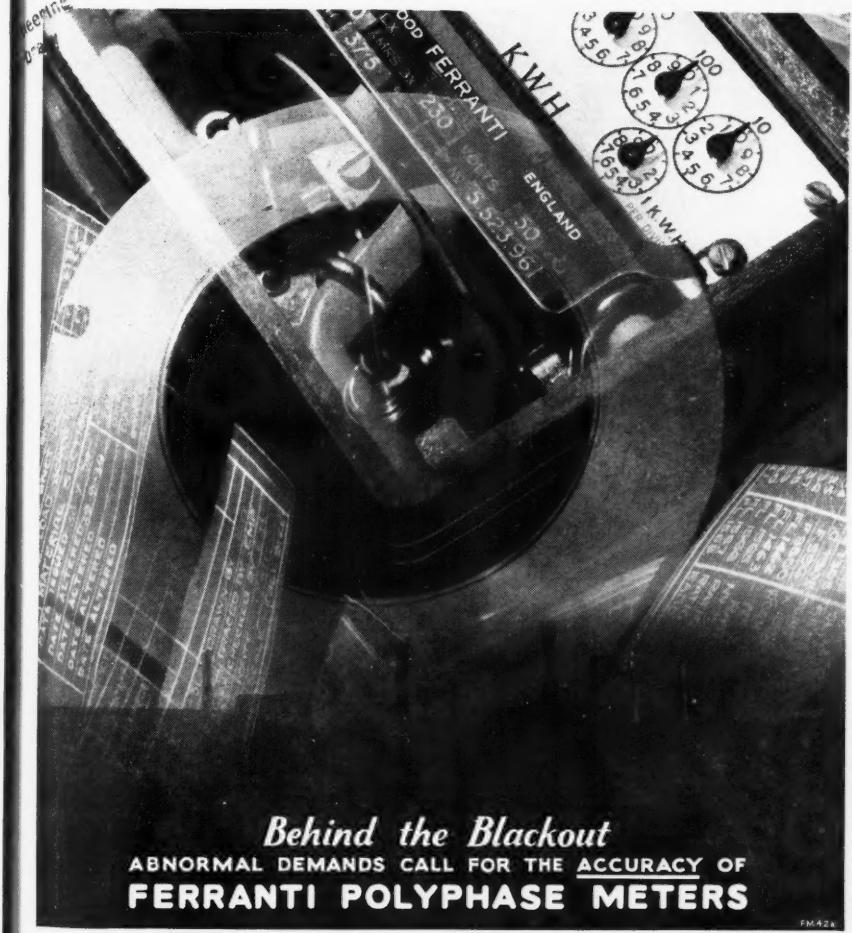
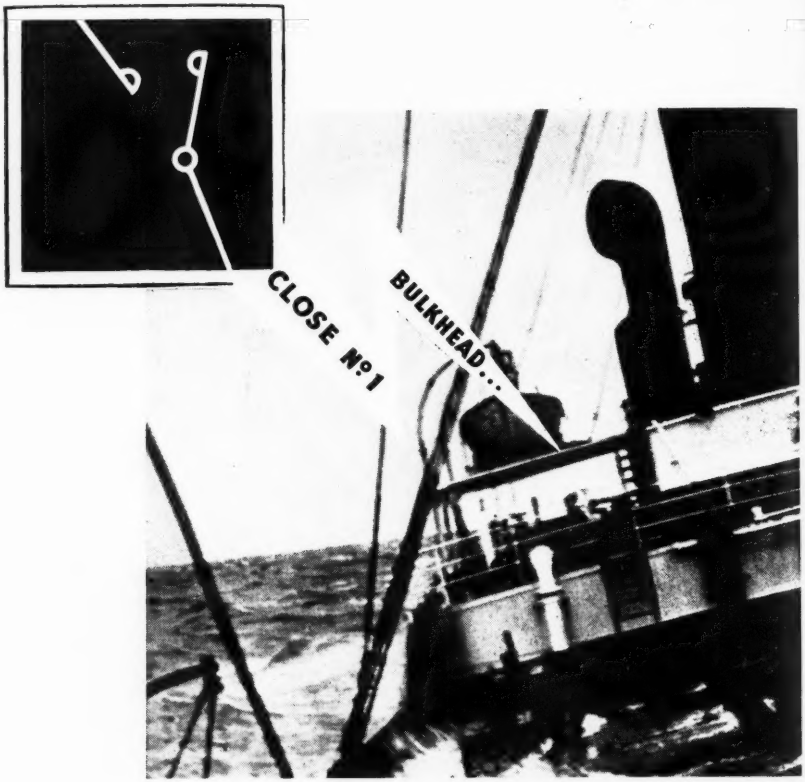
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXX. No. 3348. JANUARY 23, 1942 6d. WEEKLY





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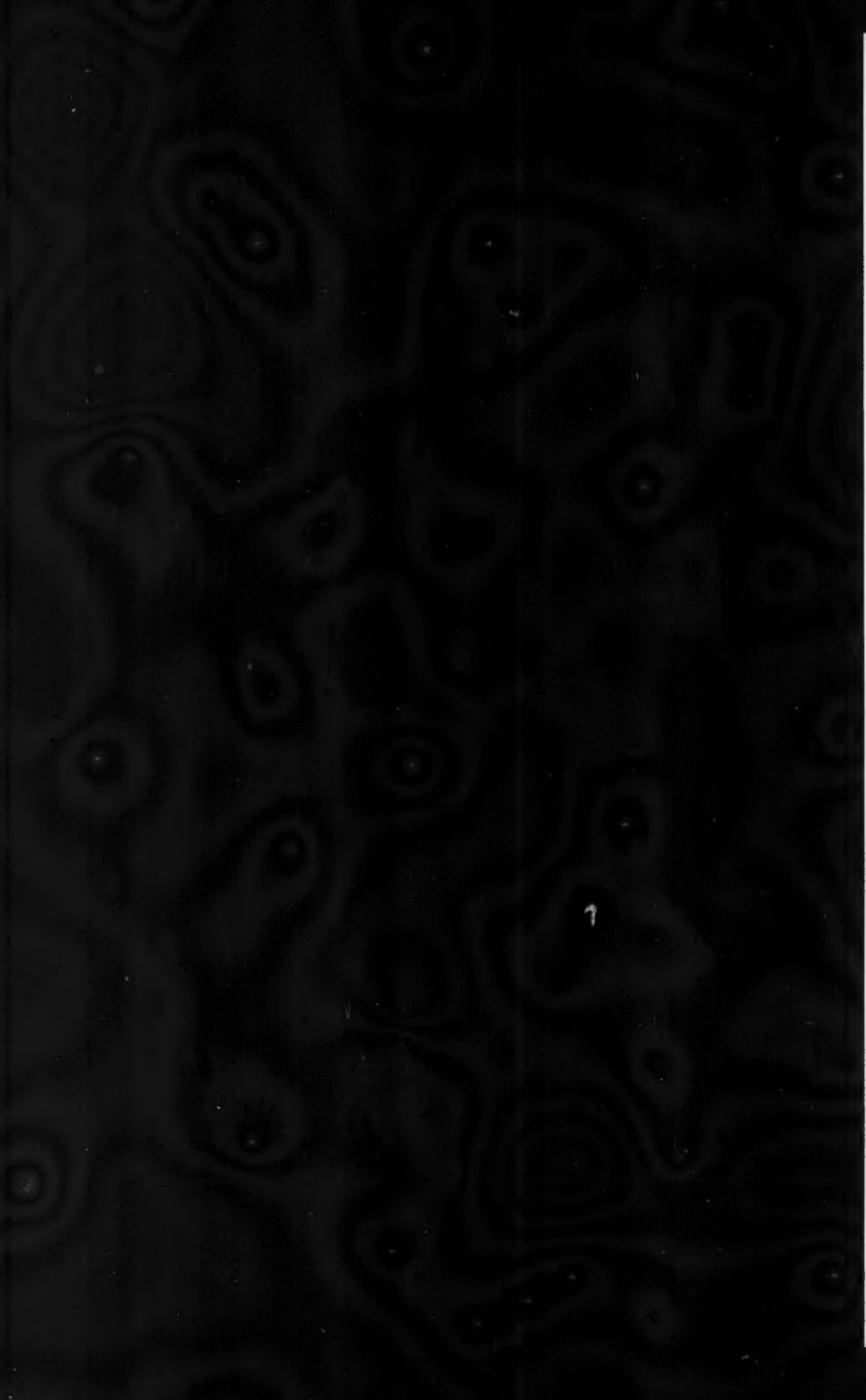

ELECTRICAL REVIEW

Volume CXXX **No. 3348**

Friday, January 23, 1942

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EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1

Telegraphic Address: "Ageekay, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (35 lines). Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign £1 14s. 8d. per annum.

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXX. No. 3348. JANUARY 23, 1942 6d. WEEKLY

Preventing Accidents

Effects of War Conditions

CONSIDERING the high stress of working in war conditions and the vast medley of new entrants to industry, it is an uncovenanted benefit that the number of electrical accidents in factories appears to be little more than that to be expected with increase in employment. No doubt this result is largely to be attributed to the habit developed during previous years of working to the appropriate regulations, even though exemptions from these are now being more freely conceded on emergency grounds.

Temporary Arrangements

Construction of new munition works and extensions to existing installations, together with the need to keep plant running continuously, have led to temporary arrangements that are responsible for a good proportion of the accidents investigated by the Electrical Branch of the Factory Department in 1940 and referred to on a later page. In the circumstances, the general tendency for temporary installations to become permanent is naturally greater. Earthing, in view of the large number of factories that are being erected in rural areas, has presented difficulties, but these are not insurmountable, as numerous articles in this journal have shown.

Economising in materials has added to normal risks. Thus, flexible cables patched with tape are kept in commission for longer than they would be in ordinary times, which makes frequent inspection all the more necessary. Restrictions on the use of steel conduits, however, does not confer absolution from the requirement that some form of mechanical protection shall be given to wiring where it is liable to damage. There can be no doubt that a well-organised system of testing and maintenance saves a good deal of time in the end. This is especially true of portable tools, and procedure on the lines described in the ELECTRICAL REVIEW of July 11th last is to be recommended.

It is very much to the credit of British switchgear designers and to the testing policy adopted by manufacturers that there has been so slight an increase in the number of high-voltage circuit-breaker failures, in spite of the additional heavy duties imposed on them in clearing faults on bomb-damaged cables. Nevertheless, this high standard of performance will only be kept up so long as proper attention is paid to maintenance, more particularly with regard to the changing of oil after severe operating service and to the correct functioning of protective apparatus.

Unnecessary Risks

Pardonable, if misplaced, zeal in the past of workmen to avoid loss of output through cutting off the supply for minor adjustments has resulted in injuries due to short-circuits, which might have been avoided if a few moments had been spent in such ways as taping tools or improvising insulating screens.

Although accidents that can be ascribed to the use of electricity form only a very

small proportion of the total from all causes, it is well worth while taking pains to prevent them—and a considerable proportion can be prevented by the exercise of only a reasonable amount of foresight and care by the management as well as by operatives. "Safety first" may not be a very compelling slogan in present circumstances, but it is actually of more importance now than ever it was. An accident that incapacitates workers reduces the man-power behind the struggle for national survival. It may also mean that machinery and equipment that occupies the time of many skilled men in repair or replacement will be out of commission when the need for it is greatest.

System Protection

As with other forms of insurance, expenditure is often grudged on protective gear. Yet when it is required to function its reliability is beyond price. Performance adequate to modern requirements is obtainable only by the methodical and highly technical attention to innumerable details such as is apparent in the I.E.E. (Transmission Section) paper of Messrs. W. Casson and F. H. Birch, which has resulted in a fault-performance of 92 per cent. correct on the grid system (with but few pilots) of the Central Electricity Board amid the war hazards of 1940. If a return of fault-performance on a common basis were published by all undertakings, the effect might be as noticeable as that which has been produced by the Electricity Commissioners' Fuel Returns on the thermal efficiency of generation.

Registration and Appointments

WE mentioned a month or so ago that it was proposed to merge the Central and Supplementary Registers in a new Appointments Branch of the Ministry of Labour and National Service. This is naturally taking a little time but we are told by the Ministry that it is hoped to have the new scheme in operation soon. The change will be more than one of organisation. It is the function of the Registers to act as pools upon which Government Departments can call when they want men for particular positions; it was not intended that they should act as employment bureaux. But the new Appointments Branch will endeavour to find suitable places for men who need them or who consider that they could be much better employed than they are at present.

Misunderstanding

MUCH of the criticism to which the Registers have been subjected has been due to a misunderstanding of their functions. It may well be argued that the finding of jobs for applicants *should* have been their duty, but the fact remains that it was decided otherwise and their staffs were certainly not big enough to cope with such a task. It is to be hoped that criticism will be stilled by the operation of the Appointments Branch. In the meantime those who are already enrolled are urged to notify any changes of circumstances which may have occurred since their registration, *e.g.*, removals or additions to qualifications.

Space Heating

ALTHOUGH electricity is more obviously applicable to some purposes than to others, its scope is continually widening—often on account of imponderable factors that cannot easily be foreseen as well as a necessarily more complete understanding of the subject with time. While Mr. W. Gilchrist's I.E.E. Installations Section paper (the discussion of which is reported this week) gives a proper reminder that first things should be tackled first, experience has shown that any limits, based on BThU considerations, that are set to the economic use of electricity for heating the largest buildings are likely to be of temporary significance only.

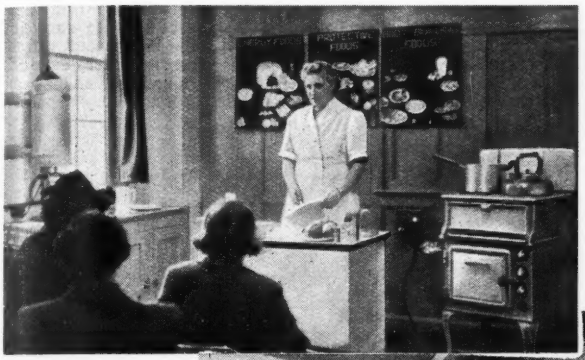
Lease-Lend Personnel

THERE is a practical way in which we in this country can express appreciation of the active sympathy shown by the people of the United States towards us in our ordeal by air bombardment. Now that there is a possibility of their being exposed to similar hazards we can place all our experience at their disposal, even to the extent of our Government's offering the services of electrical engineers with first-hand knowledge of measures found effective here in keeping the supply of electricity going. Such men can ill be spared from among us, but an offer of this kind is the least we can make in recognition of the unforgettable generosity of our great allies.

Rural Electrification

Now and After the War

DESPITE many difficulties, rural electrification cannot be considered at a standstill for the duration of the war. Although certain branches of it have inevitably been forced into the background, in some respects the war has focused increased attention on the advantages of electricity for agricultural purposes and for the development of industry in rural areas. More important still, perhaps, is the work which is being carried on all the while by electricity undertakings for the time when, with peace restored, the need for having plans for rural development ready and to hand will be of the utmost importance to the nation.



The West Gloucestershire Power Co. is wholeheartedly supporting the National Food Campaign. Here one of its demonstrators is seen conducting a demonstration at the company's showroom at Dursley. Right: The servicing of radio apparatus has a particular wartime importance

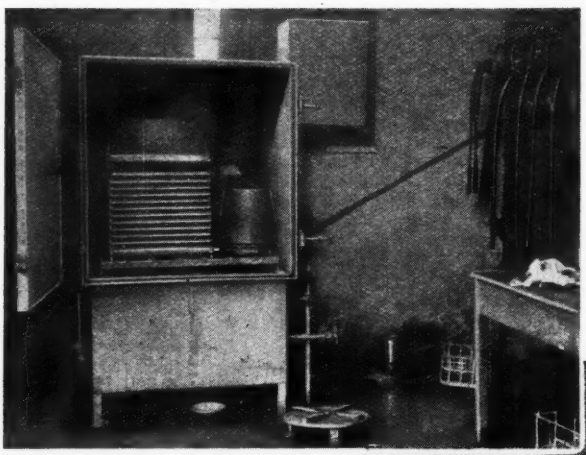
An example of the way in which an undertaking, while providing all the facilities possible for consumers under wartime conditions is not neglecting to think ahead, is furnished by the West Gloucestershire Power Co., Ltd. (engineer and manager, Mr. H. S. Ellis, M.I.Mech.E., M.I.E.E.). "Thinking ahead" might in fact well be the motto of this company, which knows what its objects are and gets on with the job.

This policy has been dictated to some extent by the unpromising nature of some parts of the area served, which are devoid of "plums" in the way of towns or industrial areas. There are indeed only seven small towns in the company's area of 680 square miles, an area which extends round both sides of the Bristol Channel from the fringe of Wales just outside Newport, north-eastward to the Forest of Dean, to just south of Gloucester, westward to the Cotswolds and southward almost to Bristol and Bath. The population, too, is normally only about 150,000, though an influx from evacuation areas has increased this considerably.

In the circumstances it will be realised that financial considerations necessitate making the most of any opportunities that arise in extension work. It is something of an achievement therefore that since it started operations in 1923 the company has succeeded in connecting 22,000 consumers, probably 60 per cent. of the potential number.

Some parts of the area can be claimed to have

reached saturation point with regard to connections but the degree of use offers plenty of scope for development. The figure of one



Of the 300 or so farms connected one in seven does its milking, sterilising and most of its other jobs electrically. The sterilising and pumping plant at Mr. F. C. Baber's Box Farm at Blakeney are shown here

cooker for every ten consumers is encouraging and it is satisfactory to record that of the 300 or so farms connected one in seven does its milking, sterilising and most of its other jobs electrically.

Before the war the undertaking could justly be proud of its energetic sales policy. For example, in the year immediately preceding hostilities, 450 fires, 750 irons, 210 kettles, 205 cleaners and 350 radio receivers were included in the apparatus sold. Like other undertakings the company has discontinued its apparatus hire, hire-purchase and credit schemes. The reason has not so much been the lack of equipment as the need to minimise the clerical work; simple cash sales save labour, paper and postage. An item treated by the company as of particular wartime importance is that of servicing and repairing domestic appliances of every description.

As well as carrying out a heavy programme of extension work bearing directly on the national war effort the company has co-operated with the Ministry of Food in the National Food Campaign. Working closely with the County Council as many as twelve demonstrations a week have been carried out though nowadays only a small number are given. In the last eighteen months nearly 150 demonstrations have been given by the company, the services of the demonstrators as well as the cooking equipment and materials all being provided free.

Though a normal peacetime service, another invaluable facility provided by the company has a special wartime significance. This is the servicing of radio apparatus. Radio is rightly considered an essential feature of national life and the undertaking is prepared to repair any receiver whether it was supplied by the company or not. First-class instruments are used to carry out the repairs and extreme care is taken by those concerned in handling and storing the apparatus.

The company takes pride in its service to consumers in giving them the benefit of its knowledge in non-electrical matters such as kitchen and canteen planning. In this respect a particularly useful service is being rendered by giving advice on the establishment of works canteens which have now, by Government Order, to be furnished by all concerns employing more than thirty persons. Good planning leads to well-served, piping hot meals and thus to contented workpeople and in turn to the installation of electrical apparatus in the canteen and in the home.

Though the area contains so few towns, communal feeding centres, or British Restaurants as they are now more usually called, are being established. In this work the company is co-operating wholeheartedly, seeing in the scheme not only a wartime expedient but

a permanent peacetime amenity aiming at helping the housewife by removing some of the drudgery from the home. Incidentally, one of the British Restaurants has been combined with an evacuees' home.

The company would like to see such communal services extended on a permanent basis, providing centres for food preservation, laundry facilities and the borrowing of certain apparatus in the same way as books are borrowed from a public library.

Old ideas and formulæ which have outlived their usefulness it is considered should be discarded and in the planning of the new homes and new towns the electricity authorities should boldly take their place alongside the architect, the builder and the civil engineer and see that the provision of adequate electrical apparatus is part and parcel of the first planning, not something overlooked in the first place and pushed in odd corners afterwards.

Factories erected in the area as a war measure should remain and it is considered that rural industries might be started or revived as a result of the facilities offered. Unfortunately, many industries in country districts have died out that should not have done. The rural craftsman has his place in the community and deserves to be encouraged. Certain parts of the company's area are never likely to prove a profitable proposition from the electricity supply point of view, but the existence in them of factories, however small, would help to a substantial extent. Indeed, supplies to new factories often make it practicable to serve isolated houses, farms, etc., which would not otherwise justify expenditure on extensions. To deal with industrial supplies an installation department was established in 1936. This has a specialised staff and is in a position to give a comprehensive quotation for any class of work.

That rural electrical development has reached only its initial stages is fully appreciated by the company. As Mr. Hartland, the consumers' engineer, remarked when we saw him recently, "We have now got the skeleton of rural electrification but the flesh is still to be put on."

PERSONAL and SOCIAL

News of Men and Women of the Industry

BACK from her crowded seven-weeks' visit to the United States and Canada, **Miss Caroline Haslett,** Adviser on Woman Power to the Ministry of Labour and director of the Electrical Association for Women, has several ideas for assisting and co-ordinating the allied war effort, as well as for improving our homes after the war. The United States, she says, is now going through just the same phases as we did at the outbreak of the war and is most anxious to learn of the way in which we solved our problems, especially in connection with the blackout and air-raid precautions generally.

On the domestic side the United States is very much ahead of this country electrically, especially in the matter of kitchen planning. Even in a Federal housing scheme for coloured workers each house has been provided with a refrigerator. This side of development must, of course, take a back seat at the moment, but after the war American practice should receive greater attention over here.

The Ministry of Supply announces that **Sir William J. Larke,** K.B.E., has been appointed Controller of Non-Ferrous Mineral Development in the United Kingdom.

Mr. A. L. Johnson, A.M.I.E.E., who has been associated with the South London Electric Supply Corporation, Ltd., for thirty years, has recently retired from the company and his colleagues have presented him with a cheque, the presentation being made by Mr. C. W. Blake, south-western area manager of the County of London Electric Supply Co., Ltd. Mr. Johnson studied at Brighton and Finsbury Technical Colleges and commenced his career with W. T. Glover & Co., Ltd. After serving with Brighton Electricity Department, the L.C.C., and West Ham Electricity Department he joined the South London company. During the last war he served with the London Electrical Engineers R.E. (T.) and the R.F.C., being demobilised with the rank of captain. Although he has retired from the South London Company, Mr. Johnson is taking up a position in a Government Department.

Mr. S. Cory-Wright and **Mr. W. Simpson** were appointed the electrical representatives on the new council of the United Kingdom Manufacturers' and New Zealand Representatives' Association at its annual meeting held recently in Wellington.

Mr. A. N. E. McHaffie

Capt. J. S. Selley, at present serving with the R.A.O.C., has been promoted to the rank of major. He was assistant sales manager with Venner Time Switches, Ltd.

We reproduce herewith the portrait of **Mr. A. N. E. McHaffie,** who, as we reported last week, has been appointed secretary of the British Thomson-Houston Co., Ltd.

Long-service awards were recently presented to a number of employees at a special Christmas dinner held in the canteen of the Midland Electric Manufacturing Co., Ltd. Six of these were to individuals who had completed twenty-one years' service one of the recipients being **Mr. T. Birkett,** a director and former general manager. A further ten received an award of cash in lieu of the gold watch which is in normal times presented after ten years' continuous service. Owing to present-

day difficulties the Christmas dinner was held at an ordinary luncheon break. Traditional Christmas fare was served and E.N.S.A. artistes including Marie Lloyd, jun., helped to provide a "party" atmosphere.

Lieut.-Colonel Lord Dudley Gordon, D.S.O., was nominated president of the Federation of British Industries for the third successive year at the meeting of the Grand Council held on January 14th. Lord Dudley Gordon, who is chairman of J. & E. Hall, Ltd., is an ex-president of the British Engineers' Association. After serving for a number of years on the F.B.I. Grand Council he was appointed deputy president in 1939, succeeding to the presidency in 1940.

Mr. T. E. Thomas, C.B.E., general manager in charge of operations, London Passenger Transport Board, is a member of the Commission which has been set up to consider the post-war planning and reconstruction of the British railways. Another member is **Mr. F. J. Wymer,** assistant (planning) to the general manager, Southern Railway.

Mr. T. E. Thomas

The appointment of **Mr. A. H. Benjamin,** deputy chief electrical engineer of the Department of Works, New South Wales, as chief electrical engineer of the Hydro-Electric Commission, Tasmania, is reported from Australia. **Mr. H. McCulloch** has been promoted from principal assistant electrical engineer of the Commission to electrical engineer, and **Mr. Glenister Sheil,** resident engineer at Somerset Dam, Queensland, has been appointed chief civil engineer.

Mr. H. Butterworth, of the London office of the Metropolitan-Vickers Electrical Co., Ltd., has now been appointed sales manager of the company's Industrial Control Department.

Obituary

Mr. R. D. Spurr.—The death occurred in hospital at Sunderland on January 9th of Mr. Reginald Dade Spurr, M.I.E.E., deputy borough electrical engineer of Sunderland. He underwent an operation for appendicitis on Christmas Eve and had been seriously ill since. Mr. Spurr was trained at Hull and London and had held posts at Ilkeston, Birmingham, Poplar, and with the Notts and Derby Power Co. and the British Westinghouse Co. before going to Bradford, where for several years he was electrical constructional engineer and substation superintendent. From Bradford, Mr. Spurr went to Sunderland in 1922 as chief assistant engineer to the Corporation electricity undertaking, and since 1935 he had been deputy borough electrical engineer. Mr. Spurr, who was sixty-three, leaves a widow, one son and three daughters.

Mr. H. J. Smith.—The death occurred recently at St. Neots, in tragic circumstances, of Mr. H. J. Smith, a former manager of the Bedfordshire, Cambridgeshire & Huntingdonshire Electricity Co. Mr. Smith, who was sixty-six, became district manager of the B.C. & H. Co. at its inauguration in 1925, and went to St. Neots early in 1926. He retired at the end of 1939.

Mr. J. Lowson.—The death occurred at Bearsden, Glasgow, on January 11th of Mr. James Lowson, M.I.E.E., T.D., chairman of W. C. Martin & Co., Ltd., electrical engineers, Glasgow. He joined the company in 1894 and was for many years senior partner. Among important work with which he was associated were installations in famous ships. He served for nine years on the Committee of the Scottish Section of the I.E.E. and was chairman in 1914. He was also a member of the Institute of Engineers and Shipbuilders in Scotland. He was in his eighty-first year and is survived by his wife and two daughters.

Mrs. T. Bloore.—We learn with regret of the bereavement suffered by Mr. Thomas Bloore, borough electrical engineer of Sutton Coldfield, through the death of his wife. Mrs. Bloore was a prominent member of the Sutton Coldfield branch of the Electrical Association for Women.

Capt. G. G. Heathcock.—The death occurred on January 10th in the Corbett Hospital, Amblecote, of Capt. G. G. Heathcock, secretary of the Midland Electric Corporation for Power Distribution, Ltd.

Mr. John Soame Austen, whose death at Bury St. Edmunds is reported, at the age of eighty, was chairman of the British Electric Traction Co., Ltd., the Electric & General Investment Co., Ltd., the United Electric Tramways Co., of Caracas, and of other companies.

Mr. N. McLean.—We regret to record the death of Mr. Neil McLean, late borough electrical engineer of Harrogate, which occurred on January 8th at Andover, in his sixty-eighth year. Mr. McLean, who retired from the position of borough electrical engineer at Harrogate in September, 1939, had been associated with the electricity undertaking for over forty-two years, and was a member of the staff which helped to bring it into being. He became borough electrical engineer in March, 1927. He was prominently associated with the I.M.E.A., which held its convention at Harrogate in 1939, and he was an associate member of the I.E.E. Mr. McLean was cremated at Stonefall Crematorium on January 13th and his ashes were interred at Grove Road Cemetery, Harrogate.

The late Mr. N. McLean

Mr. A. Slatter.—The death occurred at Harpenden, Herts, on January 15th, of Mr. Alfred Slatter, M.I.E.E., chairman of the Adamant Engineering Co., Ltd., Luton. He was eighty-seven years of age.

Mr. J. W. Muir, city electrical engineer, Palmerston North, New Zealand, died recently at the age of fifty-two.

Wills.—The late **Major W. Moat,** O.B.E., A.M.I.E.E., D.L., of Eccleshall, Staffs., left £31,512 (net personalty £17,092).

Mr. Frank Pick, who was formerly vice-president of the London Passenger Transport Board, left estate valued at £36,433 (£27,909 net personalty).

I.M.E.A. Activities

War Damage Contributions. Grid Tariffs.

THE Incorporated Municipal Electrical Association, which moved its headquarters to Leicester early in the war, is to return to London shortly. It will have offices at Wellington House, Strand, W.C.2.

War Damage Insurance

It is reported in the January *I.M.E.A. Journal* (which appears in reduced form for the first time) that a meeting took place early in December between representatives of the Joint Committee of Electricity Supply Associations and the Treasury with regard to the Government's scheme for War Damage Insurance affecting electricity supply undertakings.

Three possible bases for contributions were put forward : capital value, units sold, and revenue. Certain representatives could not agree that the first basis would be equitable and it was proposed that the share of the damage to be borne by the industry should be apportioned as to 50 per cent. on the basis of units sold otherwise than in bulk, and as to 50 per cent. according to revenue derived from the sale of electricity otherwise than in bulk.

It was recommended that figures relating to 1938 should be adopted for the companies and to 1938–39 for municipal undertakings, except where the corresponding figures in the year preceding the date of the levy were less when the lower figures would be taken. The recommendation is now being considered by the constituent associations.

Lamps

At a meeting of the I.M.E.A./E.L.M.A. Joint Committee it was stated that it had been decided to limit supplies of the following types of lamps:—Projector, carbon filament, opal, architectural, 5-W argon-filled, small single-capped, tubular, sign, natural-coloured, Christmas-tree, candle, automobile and emergency lamps.

With regard to the 80-W fluorescent lamp it was stated by the I.M.E.A. representatives that there was a rapid falling-off in the light of these lamps during the earlier period of their life and that there was a variation in colour between the lamps of various makers. It was explained that there was an inherent drop in light output during the first 100 hours or so of the life of these lamps and consequently an efficiency of 30 lumens per watt should be used in designing installations in place of the initial rating of 35 lumens. The initial level of illumination would thus be higher than the designed value but after 100 or 200 hours the installation would settle down to the designed conditions.

E.L.M.A. is preparing data showing the lumen maintenance of these lamps throughout their life for presentation at the Committee's next meeting.

Coal Contracts

Suppliers of coal to supply undertakings have refused to relieve the buyers of responsibility for loss or damage to coal in transit. Coal has now been made voluntarily insurable under the Commodity Insurance Scheme and the Government has authorised an increase of ¼d. per ton in the distributor's margin in respect of this.

Counsel has given the opinion that coal is only insurable by the distributor where the contract is for the sale of coal into the buyer's works at a delivered price. In this case the Sale of Goods Act would not apply and the property would not vest in the buyer until it had been delivered into his works.

Women Employees

Supply authorities have been taking on and training women to replace men and it is stated that efforts have been made to persuade these women to join the Services. The National Service Committee of the N.J.I.C. for the Electricity Supply Industry has stated, however, that it received an assurance some time ago from the Ministry of Labour that such women would not be withdrawn.

Since then it has been decided to conscribe women and, it is stated, nothing is yet known as to whether women employed in electricity undertakings will be exempt. Action is being taken and it is hoped that the position will be safeguarded.

Bulk Supply Charges

The Association's Bulk Supply Committee approached the Central Electricity Board to discover whether the Board was considering any modifications of the existing grid tariff at the end of the first ten-year period. The Board was also asked why a block tariff was adopted in connection with the kW charge rather than a flat rate and whether this was still considered desirable.

The Board replied that on account of the war it would probably be necessary to extend the period of operation of the present tariffs, and there might be a general increase without modification in the form of the tariffs. The Board gave an assurance that in the event of the consideration of alternative methods of maximum demand measurement (including a proposal by the I.M.E.A. that the kW charge

should be based on the average m.d. of the four months of January, February, November and December) it would before arriving at any decision invite representatives of the I.M.E.A. and other associations to confer with it.

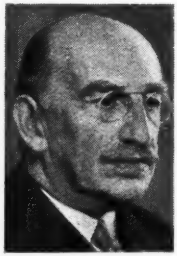
With regard to the block tariff, the Board said that its adoption was due to a desire to incorporate a "promotional" element in the tariff in so far as this was compatible with the future financial stability of the grid. Also it was desirable to recognise as far as practicable the general trend of lower cost with greater output which was characteristic of independent operation.

Without making any comment on the operation of Section 13 of the 1926 Act, the Committee and the Council are considering whether they can produce for the Board's consideration a more practicable alternative to the present grid tariff.

The Late Mr. M. J. Railing

BY the death on January 14th of Mr. Max John Railing, the General Electric Co., Ltd., and the British electrical industry have lost a valuable leader. Mr. Railing was seventy-three and had been associated with the G.E.C. for about fifty years. With Lord Hirst he collaborated in the great task of raising the company from very small beginnings to a leading position in the industry and that means that he was largely responsible for building up the electrical manufacturing industry of this country to its present importance in world economy.

His earliest work with the General Electric Co. was the development of the Fittings and Illumination Department. From that he progressed rapidly into ever widening spheres of responsibility. In 1901 he was selected to take control of the newly-formed Engineering Works at Witton, Birmingham. At that time most of the localised electricity undertakings and other large buyers were accustomed to go abroad for their plant, largely owing to the early electric lighting legislation in this country. It required at that time a great deal of courage and perseverance, supported by a belief in the brilliant future of electricity, to create an organisation for the manufacture of heavy electrical machinery, and to convince purchasers that it was in their interests to entrust to a British manufacturing firm orders for plant and equipment that had not previously been designed or constructed in this country.



The late Mr. Max Railing

With the unstinted backing and encouragement of Lord Hirst, he succeeded, and the result was seen in the steady expansion of the factories under his control. Apart from the manufacture of heavy plant, other factories were brought into being until Witton became a group of inter-related engineering works employing the population of a fair-sized town.

In 1910 Mr. Railing returned to London as general manager of the company. The duties involved in such a position, at that time already heavy enough, increased every year, for the growth of the company was continuous. New branches were established at home and overseas; new fields of application were entered; additional works were acquired and existing factories enlarged; subsidiary companies were formed, until the company's interests and activities covered the whole field of electrical engineering and application, demanding supervision of a very exacting nature. Only a man of rare capacity and deep understanding of the technical organisation and human problems involved could have succeeded in such arduous administrative labours.

In 1929 Mr. Railing became joint managing director, and in 1933 vice-chairman of the company. His work in helping to build up the world-wide organisation of the G.E.C. made him a leading figure in all questions affecting the electrical industries in both the national and international fields. He took an active interest in the British Electrical and Allied Manufacturers' Association from its formation in 1912. From 1932 to 1935, he was chairman of the Council, and thereafter a vice-president until his death. He took a leading part in many of the other organisations and committees in the electrical manufacturing and allied branches of industrial enterprise.

His knowledge and experience were often drawn upon in the national interest. He served for a considerable time as a member of the Board of Trade Advisory Council.

On the occasion of his seventieth birthday in 1938 the whole of the staff of the G.E.C. at home and overseas, then numbering some 40,000, marked the loyalty and affection which all felt for him by presenting him with his portrait by Mr. Harold Knight, R.A. This tribute bore eloquent testimony that Mr. Railing meant much more to all associated with him than a successful leader with special talents for administration and organisation; it signified something deeper. He encouraged in every possible way the ideal that all were members of one big family, and he fostered all the social and sports activities of every section of the company.

His fellow directors responded to him with the fullest confidence in his ability and with deep respect for his opinions; his departmental chiefs with loyalty and goodwill. By all he was recognised as a great leader, and loved as a man with a great heart. Max Railing leaves behind a great tradition of service and of untiring devotion to duty, and of deep-rooted conviction in the yet unexplored benefits which electricity can confer upon peoples everywhere.

The funeral took place at St. Peter's, Early, Berks, on Saturday last. On Tuesday a memorial service was held at St. Martin-in-the-Fields, London, at which there was a large and representative gathering of Mr. Railing's G.E.C. colleagues and of all branches of the electrical industry.

Bulk Supplies

The Effect of the 1926 Act

By J. L. Carr
B.Sc., A.M.I.E.E.
(Chief Electrotechnical Engineer, Manchester Electricity Department)

A CONSIDERABLE amount has been written lately from the point of view of the small undertaking which may give a mistaken impression that such undertakings are being exploited for the benefit of authorities operating generating stations. The contrary is the case, since large undertakings operating efficient generating stations have received no financial benefit and no advantage other than a measure of increased security due to connection to other stations. Small undertakings have, however, already received considerable financial and technical benefit by the provision of a supply at charges quite unattainable by their independent operation. They have, in fact, gained by the superior technical resources of the large undertakings without contributing to their cost.

It is maintained that, so far from profiting at the expense of small undertakings, selected-station owners have brought considerable benefits to these undertakings

Prior to the 1926 Act, a number of large undertakings had laid down power stations at points remote from their load centres in order to obtain high generating efficiency, but such a course entailed high transmission costs which were borne by the individual undertaking. This policy has made possible the transmission of electricity in bulk to small undertakings at low cost and has facilitated the operations of the Central Electricity Board.

Weir Report

The basis of the 1926 Act was provided by the report of the Committee presided over by Lord Weir. When this report was prepared, the average revenue for energy sold for all purposes was 2.047d. per kWh, and the average consumption per head of population was 110 kWh. It was anticipated that by restricting generation to the most efficient stations, by the virtual pooling of electricity by means of a national grid and by increasing consumption in 1940 to 500 kWh *per capita*, it would be possible to give high-voltage supplies at an average price of 1d. per kWh. With the conditions then existing, this would represent an average selling price of 1.5d. or 1.75d. per kWh. Further, the principle was recommended that the operation of the proposed Board should not cause the imposition of higher costs on the owners of selected stations than would obtain under the existing order of independent generation.

This elementary principle of justice was accepted in the framing of the subsequent Act. But it was obviously not anticipated that special measures for this purpose would be of long duration, for the report forecast that "the reaction of complete interconnection on the owner of even the most modern station will be a reduction in the cost of generation unattainable by any action of his own."

In order to safeguard the selected-station owner, certain alternatives to the ordinary grid tariff were introduced. Under Section 7, the whole of the output of a station was to be purchased at the actual cost of production, and the owner of the station would then have the option of paying for supplies required by him up to the amount generated at that station at the actual cost, adjusted according to the load factor and power factor of the supply required, together with a proper proportion of the Board's expenses other than those incurred by the Board in the purchase or generation of electricity; additional supplies would be purchased at grid tariff. Owing to the addition of the Board's expenses this section has virtually ceased to recommend itself to selected-station owners with one or two notable exceptions in which small undertakings have been permitted to erect large stations for grid purposes and so claim the benefit of large-scale production which would have been unattainable under independent operation—a further example of the *small* undertaking benefiting by the Act.

As a further alternative, Section 13 permitted a selected-station owner to obtain his supply at the generating point at a cost not exceeding that estimated for independent operation, so long as that figure was less than the grid tariff. The imposition of the grid tariff in every case would have *increased* the cost of supply to those undertakings which had provided efficient stations and would have placed a premium on inefficiency. It would, in effect, have imposed a levy on their existing consumers in order to finance the Board and reduce charges to consumers elsewhere. Such a course would have been indefensible.

An Unfulfilled Forecast

The important forecast in the Weir Report, that complete interconnection would cause a reduction in cost of generation unattainable by independent operation by such undertakings has remained unfulfilled; otherwise, Section 13 would cease to present any advantage to selected-station owners as regards costing. Generally, prior to the operation of the Board,

the undertaking with low generation costs and efficient distribution methods was able to adopt vigorous sales policies, and a high state of sales development reacted favourably on the working costs. In certain other respects, however, the anticipations of the Weir Report appear to be well substantiated. For example, the latest published figures for development relate to the year 1937–8, and give an average consumption of 419 kWh *per capita* with an average revenue of 1.047d. For domestic supplies only, the average revenue amounted to 1.522d. per kWh.

Selected Station Owners

What are the hypothetical benefits accruing to the owners of a selected station? Only for an undertaking possessing adequate financial and technical resources can Section 13 costs be lower than the grid tariff. The undertaking, having provided the efficient station, is required by the Board to operate it at high load factor and high plant factor. Maintenance of plant becomes more difficult and more costly in consequence. In effect, the owner supplies the Board with energy up to the limit of his own maximum demand at cost of generation only and is also saddled with a levy by the Electricity Commissioners towards the interest and capital charges on that part of the Board's loan required for frequency changing. Although receiving supply theoretically at no greater cost than under independent operation, the owner contributes other amounts which reduce the Board's costs with benefit to other undertakers and also provides, in effect, free use of the station. The advantage to him is, therefore, negative.

Mr. J. L. Carr

It is not always appreciated that the hypothetical charges which have to be borne by the selected-station owner must include capital charges on hypothetical spare plant although no such plant may exist. The amount of this hypothetical plant is governed by the undertaking's demand and by the rating and number of the individual machines installed. In place of the plant, grid connections are provided which have the effect of complicating the internal transmission arrangements, of increasing greatly the severity of any fault on the local system and of causing, in some cases, considerable expenditure in replacing station and substation switchgear, which, although adequate under independent operating conditions, has insufficient short-circuit rating for the conditions imposed. No compensating advantage is allowed for such expense, however, and the actual cost to the local consumer is therefore higher than under independent operation.

One of the considerations examined in the Weir Report dealt with bulk supplies from power companies and stated that the charge should be the actual cost plus a reasonable return on the capital expended in providing a particular supply.

Consider an extreme case of an isolated system possessing a generating station and about to give a bulk supply to a locality a considerable distance away. To give equality of supply costs in the two areas, the cost of the transmission line would be borne principally by the supplying undertaker; this would have the effect of increasing the charge to consumers in that area in order to give supply to the second area, a manifestly absurd proposal. And yet this method has been advocated in some quarters on the score of alleged "equity." Admittedly, with the Board's system, the burden would be spread over more consumers, but the principle remains unchanged.

A more usual case would be that of a large urban supply system, with satellite towns or urban districts, used largely as dormitories for the more affluent people engaged in business in the central area, each satellite taking a bulk supply from the larger town. Equality of tariffs would result in the imposition of charges upon the poorer consumers in the central areas for transmission to the more affluent consumers.

It is, moreover, a verifiable fact that bulk supplies are given by large undertakings, without the intervention of the grid, at prices below the grid tariff. This could not be done if the standard tariff were made compulsory. The Board would be compelled to incur additional expenditure to make a direct connection to the bulk purchaser, and to throw idle the lines previously used or, alternatively, to pay the larger undertaking rental for the use of the existing transmission system, so becoming involved in metering complications.

Factors Governing Selling Price

Even with uniform supply costs, the selling price must be governed by the efficiency of the distribution arrangements, planning and local considerations. The only alternative would be to control the price to the limit of the most inefficient or scattered undertaking, and consequently impede the rapid development in consumption which is desired by the Electricity Commissioners and is necessary for the further reduction in average selling price.

The dispersion of industry during the war period, and a degree of interconnection and interdependence in war conditions greater than were ever visualised when the grid was planned, may materially influence the future commercial policy of the Central Electricity Board. No useful purpose is served meanwhile by levelling unsubstantiated charges of inequity against a system which has served the country well or of advocating reforms which appear to be based more on sentiment than on reason.

Electro-Chemical Analysis—II

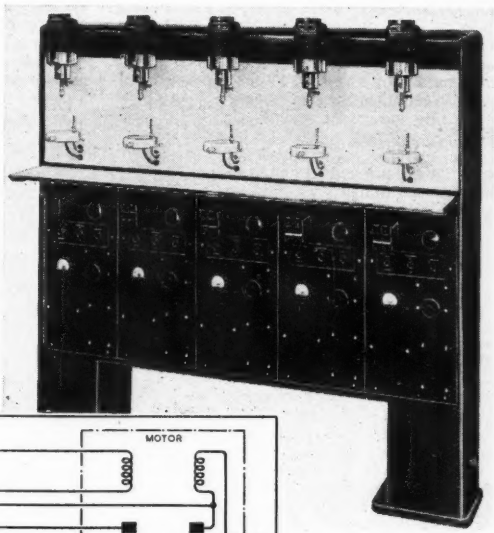
Methods of Procedure

By R. H. Powell

Last week electro-chemical analysis principles were discussed and types of equipment described. This section deals mainly with actual operations

TWO recent examples of modern electro-chemical analysis apparatus have been designed to meet specifically the large wartime demand for rapid, accurate, clean and convenient methods of alloy analysis. A single analyser with one pair of motor-rotated Fischer type electrodes (ELECTRICAL REVIEW, October 10th, 1941, p. 364) will serve laboratories in which the volume of work does not justify multi-unit apparatus. The support is arranged to swivel to one side so that when the electrolysis is completed the beaker can be gradually lowered and the electrodes simultaneously washed before switching off the current. If this precaution is not observed acid liquid on the electrodes begins to effect re-solution of the deposit with consequent inaccuracy of results.

The energising rectifier (figs. 1 and 2) is mounted in a ventilated metal case with an ammeter, transformer, low-voltage switch for changing over the outer electrode from cathode to anode, main current on-off switch, motor speed resistance and Sun-Vic energy regulator for controlling the hot-plate temperature. The five-unit apparatus (fig. 1)



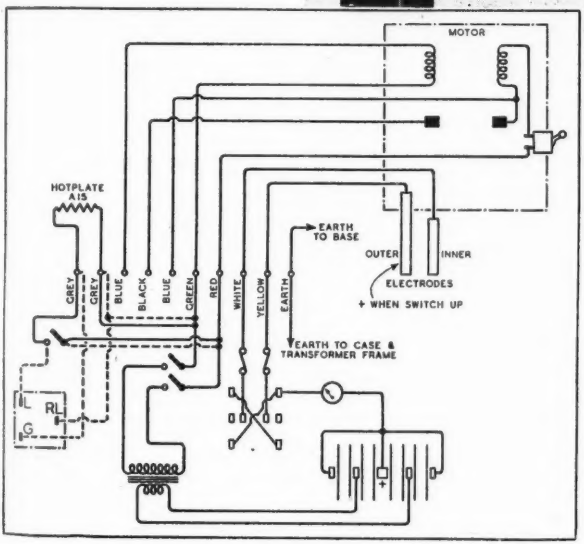


Fig. 1.—Panel-mounted five-unit rectifiers with electrode motors. Fig. 2 (left) Single analyser energising circuit diagram. Dotted lines indicate simmerstat connection if fitted

can be indefinitely multiplied to give any required output. In some laboratories upwards of 600 copper determinations alone are carried out per day by this method. Features are resistance to corrosion and ready interchangeability of components; any motor and rectifier panel can readily be withdrawn and a spare substituted very quickly.

For the determination of very small quantities of metals micro-electroanalysis apparatus (fig. 3) has been described by Lindsey and Sand (*Analyst*, 1935, *60*, 739). Developed during research on the application of controlled potential to microchemical electrolytic analysis, this apparatus is a modification of Pregl's, which was designed largely for use in the estimation of minute amounts of copper in foodstuffs. Provision is not made for mechanical agitation of the electrolyte. Stirring is brought about by bubbling through the solution contained in the electrolysis tube, surrounded by a beaker which can be heated, an inert gas introduced through the tube A. The glass mercury cups, in which the contact ends of the platinum electrodes rest, are integral parts of the gas stirring head. In addition to the determination of copper it has been successfully applied to the separation of bismuth from lead and of copper from tin and other metals in chloride solutions.

The methods of analysis of some typical alloys of interest to the electrical industry will now be quoted. The methods are chemically worked out to avoid separations involving the use of controlled cathode potential.

Zinc Base Die-Casting Alloys

Approximate composition on which this procedure is based: Sn, 2.0 per cent.; Al, 3.6 per cent.; Fe, 1.0 per cent.; Cu, 4.7 per cent.; Cd, 0.5 per cent.; Pb, 2.0 per cent.; Zn, balance.

It is not possible to remove tin as metastannic acid when iron is present in more than minute amounts. Iron in amounts up to 50 mg per hundred c.c. of electrolyte does not interfere with the determination of copper, but may slow down the rate of deposition slightly.

(A) Separation of Tin

Dissolve sample in 1 : 1 HNO_3 as follows:

1 gramme sample in 15 ml HNO_3, 1 : 1
5 gramme sample in 40 ml HNO_3, 1 : 1
10 gramme sample in 75 ml HNO_3, 1 : 1

Add one milligramme mercuric chloride to hasten solution if aluminium exceeds 2 per cent.; evaporate slowly to complete dryness, but do not allow the residue to become black due to overheating. When dehydration is complete, take up the residue with 20 ml of hot concentrated nitric acid and stir until salts are in solution. Add 50 ml of boiling distilled water and filter immediately through double ashless papers (removal of acid insoluble group metals). Ignite to SnO_2 and make corrections for Sb, P, As, if present.

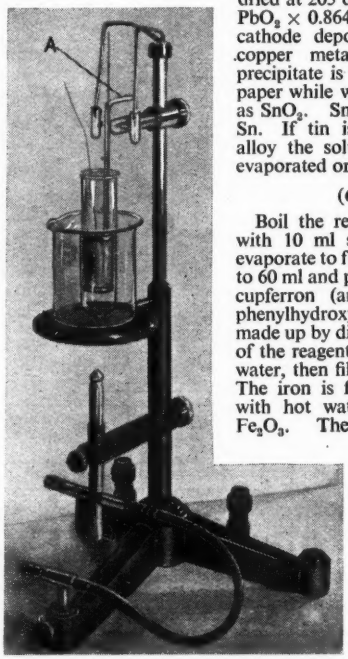


Fig. 3.—Micro-analysis apparatus arranged for bubbling electrolyte

(B) Copper and Lead

Wash the tin residue with hot 1 per cent. nitric acid and concentrate the filtrate to suitable volume for electrolysis by boiling. Neutralise any acid in excess of 5 ml per 100 ml of electrolyte, cool, and electrolyse with 4 A for at least 10 minutes (removal of Pb). Then raise to 6 A and continue until near the copper end-point, at which time add 5 ml H_2SO_4 and complete the electrolysis. Add H_2SO_4 when electrolysis is complete to prevent the deposition of cadmium and of metals baser than copper when removing electrodes. Any trace of lead will be deposited quantitatively on anode as PbO_2, which may be washed, dried at 205 deg. C. and weighed. $PbO_2 \times 0.8643$ equals Pb. The cathode deposit is weighed as copper metal. The H_2SnO_3 precipitate is ignited in the filter paper while wet and determined as SnO_2. $SnO_2 \times 0.7881$ equals Sn. If tin is absent from the alloy the solution need not be evaporated or filtered.

(C) Iron

Boil the remaining electrolyte with 10 ml sulphuric acid and evaporate to fumes. Cool, dilute to 60 ml and precipitate iron with cupferron (ammonium nitrosophenylhydroxylamine) which is made up by dissolving 6 grammes of the reagent in 100 ml distilled water, then filtering the solution. The iron is filtered off, washed with hot water and ignited to Fe_2O_3. The reason for using cupferron for this separation is that this reagent does not react with aluminium, cadmium, or zinc, and therefore provides an excellent means of separation of iron from these elements. Excess reagent is to be avoided.

(D) Aluminium

Use a separate sample and the mercury cathode method of separation. A one-gramme sample is dissolved in 10 ml 1 : 1 HCl plus 2.5 ml HNO_3. Boil for ten minutes, add 5 ml H_2SO_4, fume on a hotplate, cool and add

20 millilitres H_2O, neutralise with ammonia and then add H_2SO_4 dropwise until solution contains 3 drops excess. Cool and electrolyse cold with 2 A, using mercury cathode. When electrolysis is complete, separate the mercury from the electrolyte, filter the solution and precipitate aluminium with an excess of ammonia, filter off the gelatinous precipitate and ignite at a temperature of 2,000 deg. F. Cool in desiccator and weigh as Al_2O_3.

(*E*) *Zinc and Cadmium*

These may be determined in the filtrate from the cupferron separation. The solution is boiled to fumes with a few ml of H_2SO_4, made 0.35 N by dilution, and H_2S passed in for 30 minutes (cadmium separation). The cadmium sulphide is filtered off, washed with H_2S water, dissolved in hot HCl (1 : 3) boiled to remove H_2S with the addition of a few drops of concentrated HNO_3 near the end. Free S is filtered off, the filtrate made alkaline to phenolphthalein with KOH (20 per cent.) and the precipitated Cd $(OH)_2$ just dissolved in KCN (20 per cent.). The addition of a few drops of acetone improves the character of the deposit. Excess KCN is to be avoided. Electrolyse cold with 2 A. Weigh as metallic cadmium.

In very accurate work the precipitate should be redissolved and reprecipitated with H_2S. Zinc remaining in the H_2S solution may be determined by any standard chemical method.

Analysis of Brass (A.S.T.M : B45-36T)

In a 150 ml beaker, dissolve 1 g of brass in 10 ml of HNO_3 (sp. gr. 1.42). When the action has ceased, evaporate the solution to dryness, and bake thoroughly on the edge of a hotplate. Add 10 ml of HNO_3 (sp. gr. 1.42) and after digesting for a short time add 50 ml of hot distilled water, heat to boiling, and allow to stand and settle for about one hour, keeping the temperature just below the boiling point. Filter on double 7 cm filter paper, keeping the solution hot, and receive the filtrate in a 200 ml electrolysis beaker. Wash with boiling water, dilute to about 100 ml and insert electrodes.

In the positive terminal insert a platinum gauze anode, and in the negative terminal insert a platinum gauze cathode. Cover with a pair of split watch glasses and electrolyse. For each solution use a density of from 3 to 5 A per sq. dm. (27 to 45 A per sq. ft.). After about 45 minutes the lead will have been entirely deposited on the anode as PbO_2; without interrupting the current add to the electrolyte 3 to 4 ml of H_2SO_4 (sp.gr. 1.84) and continue the electrolysis.

When the solution is colourless, wash down the cover glasses, electrodes and sides of the beaker, raising the level of the liquid slightly, and continue the passage of the current for about 15 minutes, noting whether or not copper is deposited on the newly exposed surface of the platinum. If no copper appears, transfer about 1 ml of the colourless solution to the cavity of a porcelain test plate, and add a few drops of fresh H_2S water. If the slightest discoloration occurs, continue the electrolysis until there is no discoloration whatever upon repeating the test.

Remove the solution from the electrodes quickly without interrupting the current. Rinse the electrodes in distilled water and then dip them in two successive baths of alcohol. Dry the anode at 210 deg. C. for 30 minutes. Weigh as PbO_2, using the factor for lead 0.8643 instead of the theoretical value. Shake off the excess alcohol from the cathode and ignite the remainder by bringing it to the flame of an alcohol lamp. Keep the cathode moving continually while the alcohol burns. Weigh as metallic copper.

Accuracy

Duplicate copper determinations should check within 0.10 per cent. of copper. Duplicate lead determinations should check within 0.02 per cent. of lead. Lead results obtained by this method are likely to be about 0.01 per cent. too high.

These are but two examples of procedures worked out for the analyses of industrially important alloys, but descriptions of reliable and well-tried methods are dispersed throughout the literature and can be adapted with advantage to many of the routine methods of alloy analysis currently in use. It is deserving of mention that, in some cases, the application of electro-chemical methods may be confined to the removal of a coloured or otherwise interfering ion which hinders a subsequent operation like the qualitative removal of copper from bronzes, or from Ni-Cr resistance alloys before determination of nickel by titration with $AgNO_3$ and KCN.

It may also be remembered that, the technique having been worked out, it may be operated by junior laboratory personnel, an important factor when labour is short, and that the electrolysis having been commenced it may be left to run almost unattended until near the end of the determination. Thus the chemist can meanwhile either devote his time to other operations or can, as is done in many laboratories, run a number of parallel determinations simultaneously. Electro-chemical analysis is, therefore, clean, convenient, requires the minimum of apparatus, can be operated by junior staff and is, above all, accurate and rapid.

The accompanying illustrations are reproduced by courtesy of Griffin & Tatlock, Ltd.

Electrical Appliances in New Zealand.—The *New Zealand Electrical Journal* reports that during the year ended March 31st, 1941, increases in the numbers of ranges, water heaters and milking machines were, respectively, 13,099, 17,315 and 2,065 making the totals: ranges, 105,422; water heaters, 124,193; milking machines, 29,249.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Fires in Bathrooms

YOUR remarks about "Bathroom Fire Flex" (ELECTRICAL REVIEW, January 9th, p. 34), are very misleading although the fault is not yours. I am chairman of the S.W.S. Branch of the E.C.A. and had reported that our E.C.A. Council had discussed a letter received from B.E.A.M.A. asking whether the members of the E.C.A. were in favour of a warning label being attached by the manufacturers to every portable fire dispatched from their works, indicating that the fire should not be used in a bathroom without suitable protection. I stated that the Council had resolved "That the proposal be adopted, but that the wording should be varied to the effect that portable fires should not be used in bathrooms unless permanently fixed out of reach."

Then, in connection with portable fires in general, one member said he noted that manufacturers were cutting down the length of flex supplied with fires to four feet instead of the usual six feet. I may add that it was the opinion of some members that even four feet was too long and shorter flex would encourage users to have a socket-outlet fixed near to the position where the fire was to be used. No doubt you will see that the wrong impression is corrected as soon as possible.

I may say that I have taken the REVIEW since before the time when the "big cover" was redesigned, I can't remember when it was, but I like the small size. Also, as a contractor, I am very pleased with the prominence you give to installation matters; it is the most important branch of the industry.

Dudley. FRED. H. JENNINGS.

Standard Vehicle Batteries

AN interesting point in Mr. A. Walton's letter published in your issue of October 3rd escaped mention in my reply which appeared on October 17th. He stated rightly that the number of electric vehicles in this country with its thickly populated industrial areas is only a fraction of what it ought to be. He instanced the case of Germany where, according to data previously given in the ELECTRICAL REVIEW (the figure used by Mr. Walton was presumably due to a clerical error), there were 27,000 battery vehicles in operation in 1939.

When this country equals the usage stated, the weekly revenue from electric power provision would exceed £20,000, if an average of only one charge were given per vehicle per day. The annual revenue would thus exceed £1,000,000.

The use of home fuel will be forced on us and so encourage a considerable swing-over from the internal-combustion engine to the battery, given an easier, cheaper system of powering electric vehicles. When this swing-over reaches to half the present use here of i.c. commercial vehicles alone, the annual revenue from powering electrics will be over £10,000,000.

I do not think it is fully appreciated that battery standardisation can effect very large economies in stock holding for the make up of a range of six or eight sizes of electric road vehicles, these economies being matched in the electrical parts of the vehicles themselves. The mechanical parts, such as wheels and tyres, axles and frames, must, of course, be of strengths proportionate to payloads and should still be of design quite different from that used in internal-combustion engine practice if a lasting electric is to result.

On the electrical side, however, charging plugs (if used), carbons, reversers, contactors, brush gear, commutators, conductors, fingers, finger tips, switches and other parts can be alike in the whole range. The movement for battery standardisation is gaining, and I expect the new year will see progress thereby to a further measure of reliance on home fuel.

Ormskirk. H. N. OUTRAM.

Institution Membership

I WAS sorry to note that "Punctilio" had found difficulty in reaching a decision concerning my views, as my sympathy lies with the I.E.E. Graduates. It would appear that in an endeavour to vent his own grievance he has completely overlooked the true purpose of my letter.

No mention was made of Graduates refraining from stating this qualification in their applications, nor had I in mind estimating engineers. If "Punctilio" has had a works and drawing-office training, I feel sure that he will appreciate the importance of the estimating engineer or sales engineer as he is termed in some manufacturing firms, depending on the products handled.

T. H. CARR (Ex-Graduate).

Shipley, Yorks.

American Price Stabilisation

THE United States Office of Price Administration is studying the question of the prices to be charged for radio sets and domestic heating and cooking equipment. In the meantime manufacturers of this equipment have been asked not to increase prices above the level prevailing in October last.

INSTITUTION PROCEEDINGS

Switchgear in Heavy Industries. Sugar Mill Plant.

Industrial Switchgear

APPLICATIONS of switchgear within the heavier industries, such as collieries, chemical plants, groups of small factories, or even several sections of larger manufacturing establishments, formed the subject of an illustrated lecture by Mr. W. A. Brown to the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS in London on January 17th.

The lecturer commenced with a comparison, pointing out that in the industrial case requirements could normally be more readily defined at the outset, whereas a public distribution system needed to be planned ahead systematically to meet anticipated load growth and the cumulative effect of many increasing small demands, perhaps also having greater margin of standby transforming capacity and feeder duplication.

Extensive radial feeders were not usually encountered, but certain substations might be interconnected on their low-voltage sides (normally open) to afford limited supply in the event of the failure of a high-voltage feeder. Substation gear should be sectionalised and separated by substantial dividing walls with fireproof doors, or accommodated in separate switch-houses.

Fire Precautions

The lecturer declared it to be necessary to supplement external fusible links for releasing carbon dioxide for fire extinguishing by electrical contact heat detectors inside the switchgear enclosures as well as internal gas nozzles. Light-sensitive cells for detecting smoke and operating remote alarms were also desirable in certain large unattended substations.

Truck type switchgear was still used to some extent, although there was now a strong tendency to choose metalclad "filled" gear. The open type of construction was not the best from the short-circuit duty aspect, especially with regard to the main connections. Standard designs of truck type gear were not usually suitable for duplicate bus-bar schemes; either cumbersome contact changing or separate air break isolators appeared to be necessary, whereas for vertical isolation an oil-filled selector switch chamber could be welded directly on to the top plate of the circuit-breaker. Vertical isolation also had certain merits from the maintenance point of view, some of which the lecturer enumerated.

One advantage of closing circuit-breakers by spring mechanism, compared with the solenoid type, was that the spring could be released by a relatively small coil, if necessary energised at 30 V from a battery of small capacity. The control panel with coloured sequence indicating lamps should preferably be remote from the switchgear.

Following remarks upon the choice of current and voltage transformers, the lecturer spoke on the correct application of adequate protection, mentioning also the excellent protective capabilities of cartridge fuses of the high-rupturing-capacity type when included as a component part of low-voltage a.r circuit-breakers.

Raw-Sugar Mills

TWO short papers presented at the INSTITUTION OF ELECTRICAL ENGINEERS in London on January 22nd were concerned with the use of electricity in raw-sugar factories. One of them dealt with cane-sugar making and explained the reason why mills within the British Empire had been totally electrified more slowly than some in other parts of the world. Its author, Mr. L. B. Whitaker, of the Gray's Inn (Jamaica) Central Factory, Ltd., said that American electrical firms had found it worth while to study the particular needs of the industry, thereby enabling them to supply plant specially suited to the conditions obtaining in raw-sugar factories and to guarantee its successful service. The sporadic periods of depression experienced by that portion of the industry within the British Empire had caused a lack of knowledge and first-hand experience on the part of both sugar machinery engineers and British electrical firms which had resulted in orders being placed for steam-driven rather than electrical plant.

Jamaican All-electric Factory

Most of the figures given in this paper referred mainly to the all-electric factory at Gray's Inn, Jamaica, which had been equipped by a British manufacturer of sugar machinery, while its electrical equipment was supplied by an American firm of wide experience of the Cuban mills. Following a brief general description of the processes involved, the advantages and disadvantages of electrification were discussed in comparison with steam-driven plant. The necessity of having a sugar factory specially designed for all-electric drive was stressed, details being given of the general layout of such a plant to obtain the maximum benefits of total electrification.

The most suitable type of apparatus to employ was discussed, including notes on maintenance routine. Three-phase AC at

440 V was usual for power purposes, transformed down from the main switchboard to 110 V for lighting, heating, portable tools, small fans, etc. A 10,000-ton factory (30 by 60 in. 14-roller mill grinding 45 tons of cane per hour) would need three 500-kW steam turbo-generator sets (one standby), generally of the single-stage, non-condensing, impulse type exhausting directly into low-pressure process heating mains. Cooling air for the alternators was not easily obtainable and usually had to be filtered. Small Diesel-driven sets were required to operate the essential services when the mills were not grinding; about 75 kW in crop-time would allow for boiling off, operating the distillery, unloading cane and also a certain amount of curing and in the wet season 25 kW would suffice for the machine shop, portable tools, welding, lighting, etc. All generating plant should be capable of running in parallel.

The practice of burying cables, either direct or in conduit, was condemned because juice or sugar-laden vapour was bound to obtain entry by percolation or condensation and destroy the insulation. Main cables should be on porcelain cleats in well-drained concrete-lined trenches covered with chequer plates, or in overhead sheet-iron ducts attached to the building columns or staging. Small wiring not in the main trenches or ducts could be in self-draining conduit, but overhead.

Types of Motors

Power distribution boards should be totally enclosed, metalclad and fireproof. Motors installed would be 600 BHP for the mills and the same for the rest of the factory, all the smaller ones totally enclosed. As motors were usually taken up for the wet season, flexible couplings were desirable. All machines of 50 HP and over should be of the slipring induction type; squirrel-cage machines were quite suitable for all small centrifugal pumps. For speed variation the slipring type with secondary rheostatic control was probably the simplest. Since motors had to be installed of such sizes as would enable them to carry overloads, the combined power-factor of the whole plant might be as low as 0.65. A cheap and effective method of correction would be to install synchronous induction motors for one or two of the heavier drives, say one of the 350-HP mill motors and the vacuum or injection pumps.

Gray's Inn operating records showed that the energy generated for all purposes varied from 16.14 to 19.05 kWh per ton of cane ground. The cost of generation varied between 0.63d. and 0.31d. per kWh and in 1937 averaged 0.35d. for 950,950 kWh produced, influenced to some extent by the percentage of fibre in the cane, which affected the amount of wood-fuel consumed.

The object of this paper was to demonstrate that when plant was correctly chosen and suitably installed, with a proper maintenance routine, the application of electricity to the manufacture of cane sugar was eminently suitable.

Beet Sugar Factory

The primary aim of the second paper, submitted by Mr. B. Smith, of the British Sugar Corporation, Ltd., was to describe how electricity was used in the treatment of sugar beet through all its stages, endeavouring to convey an idea of the main scheme of operation in the author's factory, which was able to deal with 2,000 tons of beet daily. It consumed three million kWh annually, of which 2,880,000 kWh was produced by the factory generating plant and used during the operational season. The remaining 120,000 kWh was purchased for use during the rest of the year. The annual load factor was 22.765 per cent., that for the operational season being 76.523 per cent. Generation cost, based on present prices, was 0.375d. per kWh.

The paper commenced with a brief summary of the manufacturing process, indicating the desirability of having the power house at the centre of the factory. The boiler house should be capable of furnishing steam at both high and low pressures ; all its motors were totally enclosed and dust-proof as well as hose-proof. The engine room should be of brick construction with air-lock doors and so ventilated as to exclude dust from the pulp-drying plant, the lime house and sugar house, as well as steam and acid fumes.

Plant Required

A factory cutting 2,000 tons of beet a day required not less than 1,600 kW. Two steam turbo-alternators of the back-pressure type exhausting up to 30 lb. per sq. in. for process steam would be satisfactory. It was advisable for each to be capable of providing the maximum power required to operate the factory, driving a three-phase alternator of 400 V with earthed star point available for lighting and small electrical appliances. The author's preference was for unit-type switchgear rather than open boards. Motors and their controllers must withstand steam and water under varying temperature; all were totally enclosed. Of over 200 motors installed in the factory, varying in size from 3 to 245 HP, only seven were of the slipring type; the others were squirrel-cage machines arranged for straight-on or star-delta starting. In a few cases auto-transformer starting was used. All the crystallisers were separately driven at 1 RPM through reduction gearing by 3-HP motors running at 1,420 RPM. Each of 20 sugar centrifugals was separately driven by a 40-HP vertical motor above the spinning basket.

The author contended that although many factories in the British Isles had applied electricity in the best manner possible within their limited expenditure, yet both in the factory and

laboratory there still remained much room for improvement. For example, individual drives could be employed in many places where at present one large machine with line shafting now existed, provided suitable interlocking were arranged.

Coloured lamps were employed for remote indication and process signalling. Some outdoor illumination was necessary, and for indoor lighting it was advantageous to step down to 150 or 110 V, with the wiring enclosed in solid-drawn, heavy-gauge, zinc-impregnated or galvanised-steel screwed conduit. Plain dished copper conduit could be used if properly soldered into couplers.

Occasional discoloration of white sugar, of metallic origin, was prevented by the use of electro-magnetic separators. "Cuitometers" (recording milliammeters) determined the condition of thick juice as it changed to the sugar crystal stage; the resistance between two heavy electrodes passing through, but insulated from, the wall of the vacuum boiling pan increasing as the crystals formed. Alkalinity tests were applied to juice samples by laboratory electrical apparatus.

The manufacturing season extended from mid-September to the end of January. The rest of the year was occupied with completely overhauling all the plant and refining raw sugar, or drying certain ground crops. All motors were dismantled and cleaned, their stators dried out to at least 15 megohms between phases and earth, and windings varnished while hot from the drying-out process, varnish being blown into crevices by compressed air. The drying-out of motor windings was done by means of a three-phase, step-down transformer with variable tappings to enable different sizes of motor windings to be heated by circulating secondary current. Control gear was likewise reconditioned regularly.

Short-wave Radio Valves

INCREASING demands for more channels over communication circuits have reached the stage at which it is necessary to investigate thoroughly fresh means of transmission, one of which is the use of microwaves of 3 m. (100 Mc/s) down to 1 cm. (30,000 Mc/s). But their utilisation depends upon the development of appropriate oscillators and amplifiers, which in turn depend upon the availability of suitable valves. The conventional negative-grid type is used extensively within the range from 175 m. (2 Mc/s) to 5 m. (60 Mc/s) but excessive electrode losses at higher frequencies render this type of valve useless for still shorter wave operation. The causes and nature of these losses were explained in a paper by Mr. F. Cox which was submitted to the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on January 19th.

Following an outline of the theory of inadequacy of valves of ordinary design due to generation being limited by unwanted dissipation of energy at the grid, the author showed how frequency of operation was determined primarily by the dimensions and potentials of the electrodes. By suitably conditioning the latter it was possible to generate ultra-high-frequency oscillations, though it was difficult to obtain a rigorous mathematical solution. The best performance reported with a negative-resistance magnetron was an output of 100 W at a wavelength of 20 cm. (1,500 Mc/s) while with an electron-coupled magnetron 2.5 W had been generated at 5 cm. (6,000 Mc/s) the output increasing on longer wavelengths.

Grids could be so designed that, instead of modulating the amplitude of the electron stream, they would modulate its velocity; the author explained the three ways of doing so. Valves suitable for superheterodyne, or super-regenerative, or straight amplifier operation had been constructed for a wavelength of 30 cm. (1,000 Mc/s) the grid impedance being of the order of 50,000 ohms even at 5 cm. (6,000 Mc/s). Among the generators of this new class was the klystron valve oscillator which could generate 1,000 W at 20 cm. wavelength (1,500 Mc/s).

Large-Scale Heating

DURING the discussion on Mr. W. Gilchrist's paper on large-scale heating submitted to the Installations Section of the INSTITUTION OF ELECTRICAL ENGINEERS last week, Mr. R. Grierson (Northmet.) said that the author's suggestion of 100,000 cu. ft. as the largest building which should be considered for direct electric heating was far too small as was also the figure of £7 to £8 per annum revenue from a block of forty flats. Some years ago a census showed revenues from four- and five-roomed residences of £35 and even £38 per house for electricity, without taking into account expenditure on solid fuel.

Commenting on the author's suggestion for the development of thermal storage he said he did not regard its non-flexibility a drawback if it did its job. At the same time he hoped the proposed scheme would not be standardised. The layout of the plant needed a great deal of modification, while the question of reverse flow had not been mentioned, despite the fact that it was a matter which caused complaints about cost. In his view the author had not sufficient evidence to make the very sweeping statement in which he compared a building heated by embedded ceiling panels with another heated by hot water radiators, and then condemned the thermal efficiency of the ceiling heating panel. The main argument in favour of panel heating was that the fuel consumption was only about 70 per cent. of that of radiator heating, a figure arrived at from a large number of tests, whereas the author had based his statement on tests with two buildings only.

Mr. R. H. Rawll (Birmingham) felt that from the supply engineer's point of view there was greater scope in hot water service than in space heating, since the former might be developed in such a way that the cost of supply was reduced, or at least not increased. It was of no use encouraging domestic electrification in all classes of houses if some applications, particularly heating, would increase the cost of supply.

In this matter the industry was up against economics and after the war some of those classes of the population which hitherto had been considered the most desirable would not have the margin in their incomes they previously had. Therefore there should not be too much concentration on what might be termed the "super" type of house but more on the middle and working classes. Thermostatic control in working-class houses could run up some very heavy bills and there should be more hand control.

Reducing Cut-off Period

Mr. J. I. Bernard (E.D.A.) congratulated the author on the results obtained in connection with his attempt to design a local thermal storage heater, but he did not think a four-hour period of interruption was necessary. Certainly if ripple control became available, it should be possible to reduce the period of cut-off.

Mr. K. Davidson (Reyrolle) expressed a preference for separate immersion heaters for water heating, while Mr. A. G. Kemsley (City of London E.S. Co.) commenting on the references to space heating, said that the figures indicated that the author was selling at 1d. per kWh electricity which cost him 1.05d. Some of the figures in the paper were, on the average, higher than the figure taken by the author for the purpose of some of his calculations. He had found that in a one million cu. ft. building the consumption was 1 kWh per cu. ft. per annum, and in a building of half that capacity it was 1.25 kWh per cu. ft.

Readings taken from buildings varying from one million to five million cu. ft. capacity had shown that the normal day load for lighting, lifts and ventilation, but not heating, was 100 kW per million cu. ft. He visualised the time when the night maximum demand would be equal to the day maximum and then all buildings would have to pay their proportion of the standing charges.

Excessive Capital Cost

Mr. R. N. Pegg (Central London Electricity) said there were quite a few thermal storage installations where the capital cost outweighed any possible benefits obtained from the improved load factor. A consideration of the off-peak capacity was a necessary preliminary to any post-war development. Mr. P. Honey (E.D.A.) expressed his confidence in complete domestic electrification and spoke of the amount of work that had already been carried out.

Mr. S. B. Jackson expressed amazement at the suggestion that there should be collaboration between the electricity supply industry and the coal or gas industries. He quoted figures from a Ministry of Labour report on the weekly expenditure in working class households in 1937-38 and cla med that there was sufficient margin to cover domestic electrification.

Lieut. W. S. Robson, R.N.V.R., agreed that complete electric heating was not likely to be achieved with middle-class domestic premises in the near future. For intermittent space heating, however, electricity had no competitor. There was still a great deal of prejudice to be overcome in the heating of living rooms and even more in the heating of the kitchen, in view of the fact that electric heating afforded no means of disposing of rubbish. He suggested a three-heat switch as safer and more economical than a thermostat for use at night.

In a short reply the author said that if he had put in low figures for electricity in some cases, the comparative figures for coal were also low. He disagreed with those who suggested there would be less money available for amenities after the war. We were fighting for better conditions and if we did not get them then we had not won the war.

N.Z. Apprenticeship Problem

ONE reason for the shortage of qualified electrical wiremen in New Zealand is the excessive number of failures in the wiremen's examination, and steps to improve this position were discussed by representatives of employers and workers and the principals of technical colleges at a conference in Wellington.

The general discussion disclosed several probable causes of the trouble. These were stated to be as follows:—That there was not a satisfactory standard of education reached by the boys before their apprenticeship; lack of collaboration between the employers, parents or guardians of apprentices, technical schools, and apprenticeship committees; haphazard attendance at technical schools; daylight training of apprentices in technical schools appeared to be desirable; and the examination syllabus and technique required overhauling.

The conference recommended, *inter alia*, a minimum standard of education before apprenticeship, compulsory attendance at a technical school where practicable, daytime technical education (during the war, on Saturday mornings, for which the employer should be required to pay ordinary time rates), and a change in the title of the Electrical Wiremen's Registration Act to the Electrical Workers' Registration Act. The last recommendation would appear to indicate a desire to stimulate ambition in apprentices. The *New Zealand Electrical Journal* emphasises that the passing of the wiremen's examination should not be regarded as an end in itself, but only the first step in a career. It considers that there is little at present to lead the apprentice to think that he can become anything more than a wireman, and that until such a stimulant is introduced another difficulty may arise through a lack of candidates.

Causes of Accidents

Senior Electrical Inspector's Figures for 1940

ALTHOUGH annual publication of the report of the Electrical Branch of the Factory Department known as "Electrical Accidents" has been suspended, we have obtained from Mr. H. W. Swann, the Senior Electrical Inspector, certain data which we summarise below. The number of reportable accidents in factories during 1940 (*i.e.*, those involving more than three days' disability) was 729, of which 32 were fatal. The corresponding figure for 1938 (the latest officially published) was 560, including 30 fatal. Non-reportable fatalities elsewhere brought the known total up to 150 (127 in 1938); these included 67 on domestic or similar premises (50 in 1938), four of which occurred in bathrooms and six in air-raid shelters.

The rise in the number of reportable accidents seems to be related to the increase in employment, only a few being directly due to war conditions. Fifteen cases of recovery from electric shock by artificial respiration were notified. In three of these oxygen and CO_2 and "Novox" apparatus were also employed. In nine fatal and 291 non-fatal accidents skilled men and in twenty-three fatal and 405 non-fatal accidents unskilled men were concerned. Accidents to males under 21 years (121, including eight fatal) formed an unduly large proportion.

While the total number of industrial accidents was higher than in 1938 the increase was perhaps not remarkable in view of the far greater number of people employed in industry

Switchgear Largely Responsible

Regarding the type of apparatus involved, switchgear accidents represented the largest group with 193 (6 fatal) compared with 146 (9 fatal in 1938). High-voltage gear accounted for forty-five of these accidents, including four fatal as against nine out of forty in 1938; death was usually the result of burns. At voltages below 650 many burning accidents were due to short-circuits set up by the use of uninsulated tools and loose cable ends. Most of the "eye-flash" cases reported related to persons working near or passing by welding operations. Local screening indoors and the use of Crookes "A" glasses (B.S.S. 679) outdoors are recommended.

Portable apparatus and flexibles were together responsible, with plugs and adaptors, for 216 accidents (ten fatal) compared with 162 (fifteen fatal) in 1938. A high proportion of those due to flexibles were caused by the pulling out of the cable from the plug, resulting in failure of the earthing circuit, coupled often with energising of the metalwork of the tool by contact of the free end of the earth conductor with the live conductor. A large number of shocks were received from live pins of plugs connected to the supply end of flexible cables for insertion into sockets on appliances. Two men lost their lives due to unshielded screw-cap lampholders.

During the year there was an unusual number of accidents (thirty-five) associated with crane trolley wires, and the seven fatalities were the largest proportion in any one category. Often a fall results from the initial shock. Too frequently men working near crane cabins have not been warned that the wires are alive.

An analysis of thirty-three explosions associated with high-voltage switchgear (none of which was directly due to air raids) shows that in three out of four cases of automatic operation of CO_2 apparatus the oil fires were satisfactorily controlled. In the fourth the CO_2 piping was attached to walls demolished by the explosion and so damaged as to make the apparatus ineffective. From particulars given of fire explosions or fires that caused no personal injuries it appears that 6·6-kV air-cooled transformers in three substations were burnt out - due to sustained overload, the protective gear having been set high to meet peaks only, and that a fire was caused by the overheating of a repulsion-induction motor, which continued to run as a repulsion machine owing to the failure of the brush short-circuiting mechanism.

An instance in which the application of bus-zone protection to new main switchgear immediately justified its installation occurred when a man inadvertently earthed the busbars at a spout contact; all the incoming breakers tripped, saving the man from more severe injury than slight burns and the equipment from serious arcing and fire damage.

For working out of doors, the low intensity of lighting permissible is generally obtainable only by using an increased number of low-wattage lamps in appropriate fittings properly dispersed and at the right height.

Flameproof Gear

As the result of work carried out by the E.R.A., which it is hoped will appear shortly as B.S.S. 229 (Part 2), gases and vapours will be grouped in ranges, in each of which standardised flameproof apparatus can be furnished. Where acetylene, pure hydrogen and carbon bisulphide are used, however, this is impracticable and all electrical apparatus should be

placed outside the process rooms or, as in one works, motor casings should be supplied with dry nitrogen at super-atmospheric pressure.

Reference was made in "Electrical Accidents" for 1937 to the risk of molten metal penetrating the linings of high-frequency furnaces after wear and melting the water-cooled induction coil so that the resulting steam caused an explosion. A device for preventing this was described in the ELECTRICAL REVIEW of November 8th, 1940.

Examples of Mishaps

From the details available of accidents investigated by the Electrical Inspectors, we take the following: In constructing a tunnel, the original AC 100-V (comparatively safe) temporary lighting was extended at 230-V using b.c. lampholders without protective shields. A workman replacing a lamp received a fatal shock. It was found that a small end of the wire to the filament protruded through the solder contact on the exposed lamp cap and when bent over could touch the brass cap making it alive; other lamps had the same defect. Leakage from taped joints and wet lampholders on a temporary 230-V, AC lighting installation in a basement caused another fatality.

A severe shock was received from a lift gate which was found to be alive due to swarf having collected in the small clearances in the lock. The lock casing was not earthed and there was no earth connection on the outer gate, but the steel floor and inner gate were wall earthed. The operation of the lift was not affected by the leakage and although opening the cage gate stopped the lift it did not isolate the 400-V, AC control wire.

A workman drilling holes in a lorry was killed by shock from a portable drill supplied from a local three-phase 440-250-V transformer, the neutral point being connected to buried earth plates at the foot of the pole on which the transformer was mounted. Inspection revealed a single-pole switch in the neutral, a non-standard wiring of socket, excessive resistance (20 ohms) of the consumer's buried earth plate, situated some 60 yd. from the transformer, and unsatisfactory wiring of flexible at plug and drill. The t.r.s. cable was not secured and it had been pulled out, straining the cores; the red core had been used for earthing and being shorter than the other two had come out and touched the live terminal, thus energising the drill body. Consumers in this country district are easily persuaded to pay a small fee for the bi-annual testing of their earth resistances.

Shocks have been received by operatives stepping from one steel plate to another on a wooden floor, one of these having become charged from contact between the framework of a machine and a damaged cable supplying the separately earthed driving motor which was in contact with the second plate.

Forthcoming Events

Institution of Electrical Engineers.—Monday, January 26th, 5 p.m. London. Informal meeting. Discussion on "Is there an Electrical Basis for Water Divining?" to be opened by Mr. J. F. Shipley.

Wireless Section.—Tuesday, January 27th, 5 p.m. London. Informal discussion on "Frequency Modulation" to be opened by Mr. D. A. Bell, M.A., B.Sc. Wednesday, February 4th, 6 p.m. Paper: "Time Bases," by Mr. O. S. Puckle.

Meter and Instrument and Transmission Sections.—Friday, February 6th, 6 p.m. London. Paper: "Field Measurements of Insulation," by Messrs. E. A. Burton, J. S. Forrest, M.A., B.Sc., and T. R. Warren, M.A., B.Sc.

Transmission Section.—Wednesday, February 11th, 12.45 for 1 p.m. Holborn Restaurant, W.C.1. Informal luncheon (tickets 7s. each). On the same day (6 p.m.) the February Section meeting will be held at which Mr. B. Wood, M.A., will deliver a paper on "City Distribution by Solid Low-Voltage Networks."

North-Western Centre.—Saturday, January 24th, 2.30 p.m. Engineers' Club, Albert Square, Manchester. Joint meeting with the Institution of Post Office Electrical Engineers. Papers: "Metal Rectifiers," by Messrs. A. C. Williams, Ph.D., M.Sc., and L. E. Thompson, B.Sc., and "Characteristics and Applications of the Selenium Rectifier," by Mr. E. A. Richards, B.Sc.

North-Eastern Centre.—Monday, January 26th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Paper: "The Management of Protective Gear on Power Supply Systems," by Messrs. W. Casson and F. H. Birch, B.Sc.

Students' Section.—Friday, January 30th, 6.30 p.m. Neville Hall. Paper: "The Current-carrying Capacity of Cables and Overhead Conductors," by Mr. F. W. Page.

London Students' Section.—Saturday, January 24th, 3 to 7.30 p.m. Lysbeth Hall, Soho Square, W.1. Tea dance. Tickets, 3s. 6d. single and 6s. 6d. double from Mr. E. M. Hickin, 57, Oldbrough Road, North Wembley.

Electrical Industries Benevolent Association.—*Northern Counties Area.*—Monday, January 26th, 3 p.m. Tilley's Restaurant, Blackett Street, Newcastle. Annual general meeting.

Electronics Conference

A CONFERENCE on Electronics is being held by the Institute of Physics at 2 p.m. on Wednesday, January 28th, at the Royal Institution, Albemarle Street, W.1. The Conference will be presided over by Prof. J. D. Cockroft, M.A., M.Sc. (Tech.), Ph.D., F.R.S., and formal communications will be submitted on "The Efficient Production of Light by Electric Discharge," by Mr. V. J. Francis, B.Sc., A.M.I.E.E. (General Electric Co., Ltd.); "The Control Characteristics of Thyratrons and Ignitrons," by Mr. H. de B. Knight, B.Sc., M.I.E.E. (British Thomson-Houston Co., Ltd.); and "Hot-cathode Gas-filled Triodes (Thyratrons) and their Applications in Research and Industry," by Mr. A. J. Maddock, M.Sc., A.M.I.E.E. (Standard Telephones & Cables, Ltd.) It is hoped that the conference will result in the formation of an Electronics Group of the Institute.

COMMERCE and INDUSTRY

Salvage of War Materials.

Paper and Munitions

THE importance to the war effort of paper salvage has been repeatedly emphasised, but to some people the connection between paper and munitions may still be obscure so that they are apt to look upon the whole affair rather indifferently. Ammunition belts of automatic guns, so urgently needed, are now made of a leather-like substance which started out as waste paper. Paper is also required for every bomb, shell and cartridge turned out by a British factory. It is the basis of the tube that contains the charge of a bomb, and it has innumerable other uses in munition production.

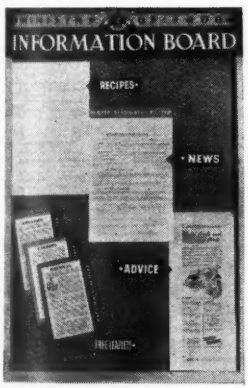
It will thus be seen that if the overwhelming superiority in arms which we all hope for is to be rapidly achieved, a great deal depends upon the enthusiastic support by everyone of the paper salvage campaign. You are again urged, therefore, to weed out drastically every bit of paper that can be spared, and the sooner it is done the more valuable will your contribution be.

Food Information

With the acute paper shortage the dissemination of news and information becomes increasingly difficult. A method of overcoming the difficulty, adopted by the Ministry of Food in collaboration with E.D.A., consists of an information board installed in electricity showrooms, and through E.D.A. the scheme has been taken up by 376 electricity supply showrooms. Its success has encouraged the Ministry and E.D.A. to extend and develop this means of spreading information, and they seek the co-operation of every electricity undertaking in the country.

The scheme includes a strip which forms the caption " Ministry of Food Information Board." This is printed in bright yellow and dark blue on paper measuring 24 in. by 5 in. The board on which it is proposed to display the news sheets should therefore be not less than 2 ft. wide and preferably about 3 ft. deep. Plywood, battened round the edges to prevent warping, can be used, or any other suitable board or stout cardboard on which the strip can be affixed with drawing pins or paste. The board should be covered with canvas or painted a suitable colour and should be strutted to stand in the showroom window close to the glass, on the showroom floor, or on a table or counter, or when the weather permits it can stand outside the showroom door. Alternatively, the board could be exhibited inside the window or entrance door, suspended at eye-level close to the glass. If it is found impossible to procure any material for making the board E.D.A. is prepared to supply one at cost price.

The latest news, information and advice regarding food will be sent to undertakings displaying the board each week through E.D.A., and will be made up of a coloured news bulletin sheet, a pull of the current M. of F. newspaper advertisement, " Food Facts from the Kitchen Front," and a special sheet of selected recipes. Additional material will be sent from time to time as it becomes available. There are, of course, numerous ways in which local showrooms will be able to make the board more attractive.



E.D.A. Information Board

Showroom News-Boards.

" Osram " Window Displays

Economy in all forms of fuel, including oil, gas or electricity, is of vital importance to the war effort, and one contribution to the " Conserve the Fuel " campaign will be seen wherever " Osram " lamp displays are installed. Based on this theme, the two 1942 window displays, not only carry the request to " Save Fuel for the Factories," but also tell how this may be achieved without reducing the illumination in the home, shop, factory or office. Each display is carried out in six colours and is about 5 ft. 6 in. by 4 ft. 6 in., the dominant

One of the G.E.C. " Osram " lamp displays for 1942

feature being a linen screen, 4 ft. by 3 ft. which suggests that one may still "light up and smile," happy in the thought that coiled-coil lamps conserve coal.

These displays, one of which we show in the accompanying illustration, will be installed in dealers' windows by the G.E.C. dealer service.

Rubber Reclamation

Recent events in Malaya are likely to result in a serious diminution in our supplies of rubber and it becomes essential that existing stocks shall be conserved and as far as possible used only for war purposes. Much can also be done in the way of rubber salvage, particularly as regards vehicle tyres. Consequently the Rubber Control Board has set up a department for supervising the collection and disposal of old tyres and it will also take into account the reclamation of all other scrap rubber, largely from domestic premises, such as old hot water bottles, rubber boots, garden hose, sponges and the like in which the proportion of recoverable rubber is much higher than in the case of tyres.

The electrical industry should be able to contribute a good deal of old rubber to the pool.

Collection of Scrap Metal

Lord Reith, Minister of Works, announced last week that his Ministry had undertaken the task of the country-wide collection of steel and iron scrap. The need for scrap recovery is urgent, and it is hoped to get 40,000 tons a week from this national drive. The campaign will fall roughly under three heads: (a) A national survey of all idle iron and steel in lots of over three tons in any one place. This survey is being accelerated and it will be made compulsory to disclose all such metal. (b) Clearance of local dumps to which lots of less than three tons should be sent as quickly as possible. (c) Acceleration of the collection of railings. Under (a) will be included disused pithead gear, bridges, rail tracks and factory machinery, as well as large accumulations of loose scrap. Under (b) will be taken the small quantities in yards of all sorts. Local dumps will be taken county by county. What is wanted is a steady, regular flow to the foundries, and this can be secured only if each town and village starts to fill up its dumps at once ready for clearing when the foundry needs it. Mr. G. M. Carter, of George M. Carter Erectors, Ltd., Newcastle, has been appointed Director of Demolition and Recovery and is in charge of all this work for the Minister of Works.

Return of Contractors' Employees

The Minister of Works has made an Order under Defence Regulation 56AB calling upon all building and civil engineering contractors who are operating under provisional certificates of registration to furnish particulars of the operatives (including electricians) on their pay rolls on the pay day in the week commencing Monday, January 19th.

Forms B.C.E.3A have been despatched to all persons concerned but should any registered person or company not have received one a postcard should be sent at once to the Chief Registrar, Building and Civil Engineering Contractors, Ministry of Works and Buildings, Sanctuary Buildings, 18, Great Smith Street, Westminster, London, S.W. 1, stating the name, present address and the number given on the provisional certificate of registration.

It is in the national interest that this return should be made accurately and promptly, and persons concerned are reminded that failure to make the return renders them liable to prosecution. Any person holding a provisional certificate endorsed to the effect that his business is suspended will not be required to make the return, but all others must do so not later than Tuesday, January 27th.

Rental of Bombed Premises

In the King's Bench Division on January 14th, Mr. Justice Stable gave judgment (with costs) for the defendant in an action brought by the London Fan & Motor Co., Ltd., against Mr. C. Silverman to recover part of rent paid in advance.

It was stated that the plaintiffs had leased premises from the defendant, the rent being payable quarterly in advance. Rent had been paid on March 25th, 1941, in respect of the ensuing quarter; in April the premises were bombed and on the 23rd of that month the plaintiffs served a notice, under the Landlord and Tenant (War Damage) Act, 1939, disclaiming the lease. The defendant did not serve a notice avoiding disclaimer and so the lease was deemed to be terminated on April 23rd, 1941.

The plaintiffs' case was that by Section 13 of the Landlord and Tenant (War Damage) (Amendment) Act, 1941, they were entitled to recover the amount of rent paid in respect of the remainder of the quarter. The Act came into operation on August 7th, 1941, and the question was whether the Section was retrospective in effect.

In his judgment Mr. Justice Stable held that if the operation of the Section was meant to be retrospective this would have been specifically stated in the Act. In the absence of such a statement he held that the claim failed.

Dry Battery Dispute

In the King's Bench Division last week Mr. Justice Hilbery concluded the hearing of an action brought by Princely Radio & Television Corporation (Gt. Britain), Ltd., against the Ever Ready Co. (Gt. Britain), Ltd., claiming damages for breach of contract. The plaintiffs maintained that they had ordered a large quantity of dry batteries which the defendants had failed to deliver, thereby involving them in a loss of profit.

The defendants denied that there was any contract and counter-claimed for a breach of contract on the plaintiffs' part by the return of batteries delivered to them by the defendants.

His lordship accepted the evidence for the defendants and dismissed the claim with costs. The counter-claim was not proceeded with and was dismissed without costs.

Working Clothes Concessions

In October last year the Electricity Commissioners notified electricity supply undertakings that they had been authorised to issue certificates for the supply, free of quota and without coupons, of certain protective clothing for the undertakings' staffs.

Under altered arrangements the Commissioners cannot now give certificates for dust coats and in the case of a number of other articles coupons must be surrendered in future. The numbers have, however, been fixed at specially low values, as follows:—Boiler suits 4; bib and brace overalls 3; men's overall long coats 3; women's wrap-over coats 3; overall jackets 2; overall trousers 2; and industrial aprons (cloth) 2. The Board

of Trade considers that this should not place an undue strain on the normal allowance of 66 coupons allowed to each person, particularly in view of the wear and tear of ordinary clothing which overalls save.

The Commissioners have been in communication with the Board of Trade on the question of the surrender of a reduced number of coupons to whole-time wearers of uniforms recognised as essential for the proper execution of their duties. The Board is prepared to agree to this in the cases of meter readers, watchmen, patrol linesmen and installation inspectors employed by supply authorities. The latter are therefore advised to write to the Assistant Secretary, Industries and Manufacturers Department (2), Board of Trade, Granville Court, Bournemouth, referring to the Commissioners' communication, at the same time indicating the types of employee for whom uniform is required; the types of uniform garments issued to them; and the estimated number of such garments to be issued during the year ending August 31st next.

Limitation of Supplies Records

Supplies in future periods of restriction will, it is expected, be computed by reference to those standard periods which are at present in force under the various Limitation of Supplies Orders. Accordingly, the Board of Trade recommends that, when scrapping papers for salvage, traders should take care to keep all accounting records, invoices, etc., relating to their business operations from April 1st, 1939, onwards, which may be of use in the calculation of their quotas under the current and future Orders.

Prices of Re-sold Goods

The Board of Trade, after consultation with the Central Price Regulation Committee, has made the Price Controlled Goods (Restriction of Re-sale) Order, 1942 (S.R. & O. 1942, No. 64), limiting, except under licence, the sale of price-controlled goods to one wholesale and one retail transaction. An exception is made in favour of re-sales at prices not exceeding those paid by the seller; and a wholesaler is afforded a defence against a charge of infringement of the Order if he can prove that the re-sale was in accordance with an established pre-war usage of his trade.

Price-controlled goods cover all price-regulated goods under the Prices of Goods Act, 1939, and goods which are subject to Maximum Price Orders under the Goods and Services (Price Control) Act, 1941. This Order is intended primarily to deal with re-sales of goods which investigations by Price Regulation Committees have shown to be responsible for many cases of unnecessary and excessive rises in prices.

Commercial Travellers' Luncheon

The Electrical Trades Commercial Travellers' Association proposes to hold its third annual lunch at the Connaught Rooms, Gt. Queen Street, London, W.C. 2, on Friday, February 6th. Mr. J. D. Reddy will take the chair, and the president, Mr. T. W. Windibank (Crompton Parkinson, Ltd.) has promised to attend, as have also officials of other Associations and prominent people connected with the electrical industry. The company present at the lunch last year numbered nearly 300, and in view of the increasing interest taken in the aims and objects of the Association, it is confidently assumed that even a larger number will attend this year. Tickets are obtainable (price 7s. 6d.) from Mr. S. Johnson, hon. secretary, 78, The Ridgeway, Waddon, Surrey.

Corporation Employees and Home Guard

The town clerk of Darlington recently reported that under the new conditions of service in the Home Guard, members would be unable to resign. He pointed out that if employees of the gas, electricity and water undertakings who were in the Home Guard, accepted these conditions, these undertakings might be seriously affected in the carrying out of their normal work. The Corporation has therefore decided to request all employees of these undertakings to resign from the Home Guard pending further information from the Government.

Control of Antimony

The Minister of Supply has made the Control of Non-Ferrous Metals (No. 8) (Antimony) Order, 1942, which came into force on January 19th. Copies of the Order (price 1d.) may be obtained from H.M. Stationery Office, York House, Kingsway, W.C. 2, or through any bookseller.

Calendars

A charming picture of a hunting scene decorates the calendar with monthly sheets sent to us by Mr. G. H. Graves, of Manchester.

The Mopump "Waterfall" advertisements of Rhodes, Brydon & Youatt, Ltd., which appeared in several technical journals, have been reproduced on their calendar for 1942 which has twelve sheets showing the current, previous and succeeding months.

Fatality

An inquest was held at Romford on January 14th into the death of a seven-year-old boy, Terence Crisp, of Hornchurch, who received a fatal electric shock while taking a bath. The evidence showed that the boy came into contact with an electric fire the connecting flex of which had been stripped in one place.

Change of Name

Marconi-Ekco Instruments, Ltd., has changed its name to Marconi Instruments, Ltd. Its addresses remain unchanged.

New Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A priced and illustrated leaflet on electric "unit" heaters giving technical information regarding the company's 5-, 10-, 15- and 20-kW models and also examples of layout in diagrammatic form for workshops.

Harvey Frost & Co., Ltd., Bishop's Stortford, Herts.—Trade price list of rubber cable vulcanisers and instruction booklet for jointing multicore cables.

Taylor Electrical Instruments, Ltd., 148A, High Street, Slough, Bucks.—Leaflet showing increases in the prices of the company's instruments.

ELECTRICITY SUPPLY

Scottish Power Requirements.

Aberdeenshire.—POWER SUPPLY.—Speaking a a recent meeting of the County Finance Committee, when it was decided to confer with other counties in north-east Scotland on electrical development, Mr. H. L. Fraser, county clerk, said that the Grampian Electricity Supply Co. had now reached a stage of development at which it was difficult for the company to give Aberdeenshire extra power. When it was asked for additional power for a new quarry which would have to be developed the company said it could only provide this if the county reduced its power requirements elsewhere. The company, as they knew, had promoted a Bill, but Inverness-shire and other counties opposed it on the ground of prejudice to the Highland area. If additional power were not obtained from hydro-electric plant, some other provision must be made so that development in Aberdeenshire should not be held up.

Barrow-in-Furness.—EXTENSIONS.—The Electricity Committee has obtained consent to erect overhead lines and is also to provide a supply in Hindpool Road at a cost of £248. Sanction has been obtained to borrow £5,000 for mains and services.

Dumfries.—EXTENDED AREA.—The Town Council at its last meeting approved a recommendation of the Electricity Committee that application should be made to the Electricity Commissioners for sanction to a loan of £5,000 for payment to the Kirkcudbright county council as compensation in respect of the transfer to Dumfries of the rights of supply in the Lincluden Extension Area. In the event of the Commissioners refusing borrowing powers, it is proposed that the sum shall be paid from the Electricity Department's reserve or revenue accounts.

Folkestone.—PROTEST AGAINST PRICE INCREASE.—The Town Council has decided to protest at an increase in electricity charges notified by the Folkestone Electricity Supply Co., Ltd. Speaking in the debate Councillor Reid said that the company was " prepared to take all the profits in the rich years and then when the lean years came along they put an extra burden on consumers."

Higham Ferrers (Northants.).—SHELTER HEATING.—The use of electric heaters for air-raid shelters at Higham Ferrers has been disallowed by the regional authorities.

Hull.—LOAN.—Sanction to borrow £53,507 has been obtained by the Electricity Committee.

London. — NORTHMET CHARGES. — Wembley Council, which sent a strong protest to the Electricity Commissioners against the Northmet Power Co.'s increase of 2s. 6d. in the basic charge to " all in " consumers—since suspended—is now asking for an investigation into the previous increase of 12½ per cent. in the company's charges.

SOUTHWARK.—The Electricity Committee is to provide a supply at a cost of £1,200.

Millom.—LOAN SANCTION.—The Rural District Council has received the consent of the Electricity Commissioners to a loan for substation gear.

The " Southern " Locomotive.

TRANSPORT

L.N.E.R.—ILLUMINATION OF STATION NAMES.—A new system of station-name illumination, known as " controlled beam " lighting and conforming in all respects to the A.R.P. regulations, is being experimented with by electrical engineers of the London & North Eastern Railway. At several provincial and London suburban stations, including Finsbury Park, Peterborough, Stratford and Ipswich, small black nameboards bearing the station name in 2½ in. or 3 in. white letters have been fixed in convenient positions on station walls. Above and in front of each nameboard at the end of a bracket is a slotted metal box containing an electric lamp and so designed that the width of the light beam does not exceed 3½ in., and its length is no greater than that of the lettering—in no case more than the 22 in. allowed for A.R.P. shelter signs—and they can therefore be used during air raids. If the results are successful some 200 more stations will probably be equipped in a similar manner.

Sheffield.—FUTURE OF TRAMS.—Considerable controversy has been aroused concerning future transport in Sheffield by a paragraph in the report of the Town Planning Committee, stating that the Committee had been advised, and believed that at a not very distant date, trams would probably cease to operate and that the only method of public transport which would then exist will be motor omnibuses. So much opposition was shown by members of the City Council that the paragraph did not appear in the report presented to the last meeting of the City Council, and the Committee has decided to give further consideration to the part which trams may play in the city's transport system.

New S.R. Locomotive

Successful Trials

SOME details were given this week of the new locomotive which the Southern Railway is putting into service after satisfactory tests. It consists of a box-type cab mounted on two six-wheel bogies; each of the six axles is driven by a motor through single-reduction spur gearing. The controller has 26 running positions giving very smooth acceleration.

Four shoes on each side serve to take current from the conductor rail and the loco also has a pantograph collector for use in sidings where overhead lines are provided. The difficulty presented by the inability of a locomotive to span long breaks in the conductor rail is stated to have been overcome; it can travel from 200 to 300 yards without its shoes coming into contact with the rail.

It is proposed to employ the new loco on both freight and passenger services and it is claimed that it can accelerate a 1,000-ton train from standstill to 24 MPH in less than two minutes and can haul a 14-coach passenger train at a speed of 75 MPH. An electrically-operated boiler is included in the equipment to provide steam for heating passenger trains.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The **Westinghouse Brake & Signal Co., Ltd.**, in a preliminary statement, reports a net profit for the year to September 30th of £141,629, as compared with £159,781 in the preceding year. General reserve receives £25,000, staff pensions account £10,000, and £50,000 is appropriated to reserve for contingencies. It is proposed to pay a dividend of 10 per cent., less tax, for the year (unchanged) and to carry forward £91,273 (against £92,384 brought in).

The **Dublin United Transport Co.** has announced a final dividend of 3 per cent., making 5 per cent. for the year (against 4 per cent.). After providing £160,000 for tax the balance carried forward is £23,533 (against £21,561 brought in).

Radio Rentals, Ltd., proposes to pay a final dividend of 6 per cent., less tax, on the ordinary shares, making 10 per cent. for the year to August 31st. A similar dividend was paid in the previous year.

The **Amazon Telegraph Co., Ltd.**, states that the gross revenue for 1940-41 was £26,413 (against £29,362). After meeting expenses there is a loss of £1,245, against a profit of £2,773, reducing the amount carried forward to £2,463.

R. B. Pullin & Co., Ltd., are paying a final dividend of 15 per cent., maintaining the distribution for the year at 20 per cent.

The **Electrical Industries Trust** is making a distribution of 1.8d. (same) per unit, tax free.

New Companies

A. B. Accessories Co., Ltd.—Private company. Registered January 7th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in articles relating to the business of electricians and electrical engineers, etc. Subscribers: E. L. Aumonies, 66, Mayfield Avenue, N. Finchley, and R. W. Ham, c/o Marshall Electrical Co., Ltd., 4, Tattenham Mews, W.1. Solicitors: A. J. Adams and Adams, 3/4, Clements Inn, W.C.2.

John Pearce (Electrical Engineers), Ltd.—Private company. Registered January 8th. Capital, £500. Objects: To acquire the business of an electrical engineer carried on by J. Pearce at 28, Tonman Street, Manchester, 3, as John Pearce and Co. Directors: J. Pearce, Fairlawn, Carr Brow, High Lane, Stockport, and W. R. Lee, 14, Brookdale Avenue, Manchester. Registered office: 28, Tonman Street, Manchester 3.

Park Engineering Co. (Nottingham), Ltd.—Private company. Registered December 30th. Capital, £1,500. Objects: To carry on the business of engineers, merchants, fitters, manufacturers of electrical and other machinery, wire drawers, smiths, welders, tube makers, etc. Directors: A. A. Wheeler, "Orchardleigh," Eastwood, Notts, and two others. Secretary: A. A. Wheeler. Registered office: 9, Derby Road, Nottingham.

Companies' Returns

Statements of Capital

Dubilier Condenser Co. (1925), Ltd.—Capital, £500,000 in 500,000 preference shares of 10s. and 5,000,000 ordinary shares of 1s. each. Return dated August 6th (filed October 2nd). 200,000 preference and 1,539,375 ordinary shares taken up. £176,968 15s. paid. Mortgages and charges: Nil.

Lamp Caps, Ltd.—Capital, £50,000 in £1 shares. Return dated July 10th. All shares taken up. £50,000 paid. Mortgages and charges: Nil.

Pennington, Stevens & Taylor, Ltd.—Capital, £7,000 in £1 shares. Return dated November 6th. 6,912 shares taken up. £6,762 paid. £150 considered as paid. Mortgages and charges: Nil.

H. Church & Co. (Essex), Ltd.—Capital, £7,000 in £1 shares. Return dated September 18th. All shares taken up. £7,000 paid. Mortgages and charges: £3,000.

Feeny & Johnson, Ltd.—Capital, £3,000 in 3,000 shares of £1 each. Return dated July 10th (filed September 1st). 2,000 shares taken up. £2,000 paid. Mortgages and charges: Nil.

Floodlighting & Fittings, Ltd.—Capital, £2,000 in 1,900 shares of £1 each and 1,000 shares at 2s. each. Return dated December 20th. All shares taken up. £1,820 paid. £100 considered as paid. £80 unpaid. Mortgages and charges: Nil.

Luxram Lamp Works (Holdings), Ltd.—Capital, £5,000 in 5,000 shares of £1 each. Return dated December 20th (filed December 13th). 4,181 shares taken up. £4,181 paid. Mortgages and charges: Nil.

Mortgages and Charges

Border Electrical Service, Ltd.—Assignment on December 29th, 1941, of certain contract moneys, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

Seal Electric, Ltd.—Satisfaction to the extent of £1,000 on January 7th, 1941, of mortgage dated October 1st, 1937, and registered October 4th, 1937. According to the register of mortgages the mortgage registered October 4th, 1937, originally secured £1,000.

Underwood (Electric), Ltd.—Assignment of proceeds of various contracts, dated December 23rd, 1941, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £1,800.

Liquidations

Neron Lamps, Ltd.—Meeting, February 12th, at Magnet House, Kingsway, London, W.C.2, to receive an account of the winding-up by the liquidator, Mr. R. Adams.

Musgrave Radio, Ltd.—Meeting, February 13th, at 33, Park Road, West Hartlepool, to receive an account of the winding-up by the liquidator, Mr. A. G. Brayshaw.

STOCKS AND SHARES

TUESDAY EVENING.

IN spite of the gravity of the Malayan news, prices in the Stock Exchange markets, as a whole, maintain the steadiness that has characterised them since the year began. A good deal of business takes place every day, some of it so quietly as scarcely to change the prices of the stocks and shares with which it is concerned. A predominant factor in the gilt-edged markets is the forthcoming repayment of India 3 and 2½ per cent. stocks, for which the earliest distribution will be made on March 2nd. Most people prefer not to invest, or to reinvest, their money until they have the cash actually free for this purpose. Prices of gilt-edged stocks are being advanced by way of discounting the future. The real rush to reinvest the India money will not come, however, until the cash is in the hands of the present holders of the India stocks.

Reinvestment

The greater part of the money will go, it is natural to assume, into one or other of the various War Loans, but a certain amount can be relied upon to seek existing Stock Exchange channels for its employment. Amongst these stocks, Central Electricity issues, although they are not eligible as trustee stocks, are being closely examined for the security that they afford and the yield that they offer. Rises of 10s. and £1 show the result of this scrutiny.

Manufacturing and equipment shares remain consistently good. One of the outstanding features of the moment is the popularity of stocks and shares in companies connected with Central and South America.

Electricity Supply Shares

Prices of the ordinary shares in the Home electricity companies pursue their regular ascent. This week, rises have taken place in County of London, Clyde Valley, Electric Supply Corporation, North Eastern, Midland Counties, and in several of the preference issues. The yields on the shares in this group have now shrunk to an average of rather under 4½ per cent. from the best-known shares. Nevertheless, there is no cessation to the investment of money in these shares. In the Overseas group, no changes of consequence have occurred. Atlas Electric remain at 4s.; Tokyo sixes are more or less nominal at their previous price of 12½; Perak Hydro-Electrics stand at 7s. 6d. The last-named change hands occasionally on this basis. Victoria Falls ordinary are ⅛ higher at 81s. 3d.

Price Fluctuations

Cable and Wireless preference, which lagged behind the ordinary stock last week, has come into notice and shows a gain of 2 at 103½, the ordinary stock retaining its last week's gain of 3 points at 68½. Telephone Rentals moved up to 9s. Anglo-Portuguese are a rather better market at 15s., showing at this price a return of 10.2/3 per cent. on the money. Nervousness with regard to Indian investments is reflected in a fall of 1/16 in Calcutta Trams to 20s. Tilling ordinary at 47s. 6d. are 1/16 higher. Tilling & British Automobile Traction ordinary shares at 52s. 6d. are unchanged; the dividend is reduced from 7 per cent. net to 6½ per cent. net. The earnings, as shown in the latest report, constitute a record, but as usual, the burden of taxation takes heavy toll of the profits. Shares in the iron, steel and armament industries are coming once more into favour. Vickers, for instance, are 6d. higher at 17s. 3d.; Babcock & Wilcox at 45s. 9d. are 9d. up. In the equipment and manufacturing class, General Electrics, both ordinary and preference, are better, the former being within 6d. of £4 per share, while the preference at 33s. 3d.—a rise of 9d. on the week—give the gilt-edged return of £3 18s. 2d. Ever Ready strengthened to 30s.

Central and South America

Anglo-Argentine Tramways have had another twist up, the company's 4 per cent. income stock rising to 11½, and the preference shares to 5s. 6d., showing improvements on the week of 2 points and sixpence respectively. Mexican Light & Power junior stocks have spurted in price; most of the South American and Central American stocks continue to attract speculative notice. It becomes increasingly apparent that sooner or later the Old World will have to turn to the Americas for the necessaries of life. On the assumption that the Western Hemisphere will find ready buyers for anything it can produce, the speculator and the speculative investor are putting money into stocks and shares of the companies connected with that part of the globe. As there is no great amount of supply available, it takes comparatively little dealing for prices of the shares to be abruptly moved one way or the other. At present, the buyers are in the ascendant for the reason just stated: and, if the demand persists, the prices will probably advance further.

Johnson & Phillips

The price of Johnson & Phillips shares has been advanced to 57s. on inquiry aroused by consideration of the return, which, on the 15 per cent. dividend, the shares now yield. For some time past, Johnson & Phillips have been standing at a level at which the income worked out to 5¼ per cent. At 57s. it is now 5¼ per cent. In the increasing pressure to accumulate front-rank industrial shares, Johnson & Phillips had been somewhat overlooked, and this week's advance serves to bring the shares more nearly into line with others in companies engaged in the same class of business and upon which the yield is less liberal. It is taken for

(*Concluded on page* 126)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Jan. 19	Rise or Fall	Yield p.c.
Home Electricity Companies					£ s. d.
Bournemouth and Poole	15	12½	53/9	..	4 12 9
British Power and Light	7	6	26/6	..	4 10 7
City of London	7½	7	26/3	..	5 6 9
Clyde Valley	8	8	38/3	+9d.	4 3 9
County of London	10½	8	36/3	+⅛	4 8 5
Edmundson's:					
7% Pref.	7	7	33/3	+⅛	4 4 4
Ord.	6	6	28/6	..	4 4 3
Elec. Dis. Yorkshire	9	9	42/–	..	4 5 9
Elec. Fin. and Securities	12½	12½	43/9	..	5 14 2
Elec. Supply Corporation	11½	10	45/–	+⅛	4 9 0
Isle of Thanet	2	Nil	9/–	..	—
Lancs Light and Power	7½	7½	33/9	..	4 9 0
Llanelly Elec.	5½	5½	22/–	..	5 0 0
Lond. Assoc. Electric	5½	4½	19/6	..	4 12 4
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	104½	..	4 15 8
Metropolitan	10	8	36/3	..	4 8 5
Midland Counties	8	8	38/9	+6d.	4 2 0
Mid. Elec. Power	9	9	39/6	..	4 11 2
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	30/–	+6d.	4 13 4
7% Pref.	7	7	33/–	..	4 4 10
Northampton	10	10	44/6	..	4 10 0
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/–	..	4 0 0
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	23/9	..	5 1 1
Scottish Power	8	8	38/9	..	4 2 9
Southern Areas	5	5	18/9	..	5 6 8
South London	7	7	25/–	..	5 12 0
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	20/–	..	4 10 0
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/–	..	—
Calcutta Elec.	8*	7*	34/–	..	—
Cawnpore Elec.	10	10	30/–	..	6 13 4
East African Power	7	7	27/–	..	5 3 8
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/–)	7½	7½	11/–	..	6 16 4
Madras Elec.	6*	4*	22/6	..	3 11 1
Montreal Power	1½	1½	26	..	5 15 5
Palestine Elec. "A"	Nil	Nil	20/9	..	—
Perak Hydro-elec.	6	7	7/6	..	18 13 4
Shawinigan Power	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	12½	..	—
Victoria Falls Power	15	15	81/3	+⅛	3 14 2
Whitehall Inv. Pref.	7½	7½	15/–	..	10 0 0

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Jan. 19	Rise or Fall	Yield p.c.
Public Boards					£ s. d.
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	115	+1	4 7 0
1951–73	4½	4½	108	+½	4 3 4
1963–93	3½	3½	103	+1	3 8 0
1974–94	3½	3½	99	..	3 5 8
London Elec. Trans. Ltd.	2½	2½	95	..	2 12 10
London & Home Counties 1955–75	4½	4½	109	+½	4 2 7
Lond. Pass. Trans.:					
A	4½	4½	119½	+2	3 15 4
B	5	5	117½	+2	4 5 1
C	1½	3	40	..	7 10 0
West Midlands J.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	105½	..	5 13 9
Def.	1½	1½	24½	..	6 2 5
Anglo-Portuguese	8	8	15/–	+⅛	10 13 4
Cable & Wireless:					
5½% Pref.	5½	5½	103½	+2	5 6 4
Ord.	4	4	68½	..	5 16 10
Canadian Marconi $1	Nil	4cts.	5/6	..	2 15 6
Globe Tel. & Tel.:					
Ord.	8½*	8½*	30/–	..	—
Pref.	6	6	28/9	..	4 3 4
Great Northern Tel.:					
(£10)	20	20	14½	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	27/6	..	5 9 1
Oriental Tel. Ord.	11½*	16	65/–	..	4 18 6
Telephone Props.	6	6	10/–	..	12 0 0
Tele. Rentals (5/–)	10	10	9/–	+6d.	5 11 1
Traction and Transport					
Anglo. Arg. Trans:					
First Pref. (£5)	Nil	Nil	5/6	+6d.	—
4% Inc.	Nil	Nil	11½	+2	—
Brit. Elec. Traction:					
Def. Ord.	45	45	905	..	5 0 0
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8*	8	43/9	..	3 13 1
Brazil Traction	$1	50c.	13⅜	–½	—
Calcutta Trams	8	5½	20/–	–⅛	5 10 0
Cape Elec. Trams	5	5	18/6	..	5 8 3
Lancs Transport	10	10	45/–	..	4 9 0
Mexican Light:					
1st Bonds	5	5	75	..	6 13 4
Rio 5% Bonds	5	5	92½	..	5 8 3
Southern Rly.:					
5% Prefd.	5	5	63½	..	7 17 6
5% Pref.	5	5	106½	..	4 14 0
T. Tilling	10	10	47/6	+⅛	4 4 2
Tilling & B.A.	7*	6½*	52/6	..	2 9 6
West Riding	10	10	39/6	..	5 1 3

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Jan. 19	Rise or Fall	Yield p.c.
Equipment and Manufacturing					
					£ s. d.
Aron Elec. Ord. ..	Nil	7½	23/–	..	6 10 4
Assoc. Elec.:					
Ord.	10	10	43/9	..	4 16 3
Pref.	8	8	38/9	..	4 2 4
Automatic Tel. & El.	12½	12½	48/9	..	5 2 6
Babcock & Wilcox	11	11	45/9	+9d.	4 16 1
British Aluminium	12½	10	45/9	..	4 7 4
British Insul. Ord.	20	20	90/–	..	4 9 0
British Thermostat (5/–)	18½	18½	13/9	..	6 14 6
British Vac. Cleaner (5/–)	12½	10	11/3	–⅛	4 9 0
Brush Ord. ..	Nil	Nil	4/6	..	—
Callender's ..	15	15	73/9	..	4 1 4
Chloride Elec. Storage	15	15	71/3	..	4 4 3
Consolidated Signal	17	17	80/–	..	4 5 0
Crabtree (10/–) ..	17½	17½	28/3	..	6 4 0
Crompton Parkinson Ord. (5/–) ..	30	20	21/3	..	4 14 1
E. K. Cole (5/–) ..	Nil	7	9/–.	..	3 17 9
E.M.I. (10/–) ..	Nil	6	15/–	..	4 0 0
Electric Construction	10½	10	34/6	..	5 16 0
Enfield Cable Ord.	16½	12½	53/9	..	4 13 0
Elecl. Switchgear (10/–)	16	10	20/–	..	5 0 0
English Electric ..	10	10	37/6	..	5 6 8
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)..	25*	22*	40/–	..	2 15 0
Ever Ready (5/–) ..	40	40	30/–	+6d.	6 13 4
Falk Stadelmann ..	7	7½	22/–	..	6 16 4
Ferranti Pref. ..	7	7	26/3	..	5 6 10
G.E.C.:					
Pref.	6½	6½	33/3	+9d.	3 18 2
Ord.	20	17½	79/6	+9d.	4 8 0
Greenwood & Batley	15	13	26/3	..	9 18 2
Hall Telephone(10/–)	15	10	15/7½	..	6 8 0
Henley's (5/–) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/–	..	6 13 4
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion	32½	30	107/6	..	5 11 6
J. Lucas	15	15	66/3	..	4 10 8
Johnson & Phillips	15	15	57/–	+⅛	5 5 1
Lancashire Dynamo	20	20	66/3	..	6 0 10
Laurence, Scott (5/–)	15	15	11/–	..	6 16 4
London Elec. Wire	7½	7½	25/–	..	6 0 0
Mather & Platt ..	13½	10	42/6	..	4 14 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	92/6	..	4 6 9
Pye Deferred (5/–)..	25	25	15/–	..	8 6 8
Revo (10/–) ..	5	20	25/7½	..	7 16 0
Revrolle	12½	12½	56/3	..	4 9 0
Siemens Ord. ..	7½	7½	25/–	..	6 0 0
Strand Elec. (5/–) ..	2	4	3/6	..	5 14 4
S. Smith (1/–) ..	50	37½	7/–	..	5 7 2
Switchgear & Cowans (5/–) ..	10	15	10/–	..	7 10 0
Tel.Condenser(10/–)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg.(5/–)	9	9	9/–	+9d.	5 0 0
Tube Investments..	23½	20	87/–	..	4 12 0
Vactric (5/–) ..	4	Nil	3/6	..	—
Vickers (10/–) ..	10	10	17/3	+6d.	5 16 0
Ward & Goldstone (5/–)	20	20	16/6	..	6 1 3
Westinghouse Brake	17½	10	50/–	–½	4 0 0
Walsall Conduits(4/–)	55	55	32/6	..	6 15 4
West, Allen (5/–) ..	7½	7½	5/–	..	7 10 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 124)

granted that the company will be able to maintain the 15 per cent. dividend which it distributed for 1939 and 1940. The year ends with December, and the report usually appears early in May. At the last general meeting, the chairman mentioned that the board felt it was wise to retain in subsidiary companies a reasonably substantial amount of profits to provide for any unforeseen contingency.

Nigerian Electric

A pleasant surprise was recently afforded to its shareholders by the Nigerian Electricity Supply Corporation, which announced a dividend of 8 per cent. on the ordinary shares as against nil in the previous year. The passing of the dividend a year ago was due to exceptional circumstances, but the recovery is sufficiently marked to have brought the shares into prominence and into demand from the speculative investor who asks where he can find elsewhere a yield of £7 12s. 5d. per cent. on his money, at the present price of the shares—21s. Moreover, the advance of the Japanese in Malaya, and the "scorched earth" policy which is being pursued by some of the Middle East tin companies, serves to direct attention to the Nigerian suppliers of tin, a number of which take their electricity from the Nigerian Electricity Corporation.

For this reason it is expected that the Nigerian Corporation will be able at least to maintain the 8 per cent. dividend. Accordingly, many thousands of shares have been bought within the past few business days.

Westinghouse Brake

Westinghouse Brake ordinary shares, after changing hands at 52s. 6d., fell back half-a-crown on the announcement of a dividend making 10 per cent. for the year—the same, that is to say, as for the previous twelve months. Expectation had looked for 12½ per cent., and there was some disappointment with the figures, although it was agreed that war conditions accounted largely for the reduction in the year's profits. On the 10 per cent. dividend, Westinghouse Brake at 50s. pay 4 per cent. on the money. Consolidated Signals at £4 return 4¼ per cent. on the basis of the 17 per cent. dividend which the Westinghouse Brake 10 per cent. makes a virtual certainty.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

3191. "Piezo-electrical investigation of pressure sequences." S. Meurer. January 28th, 1938. (Cognate application, 3192/39.) (542072.)

22657. "Devices enabling the mechanical vibrations produced by blades, strings, tuning-forks, vibrating rods, or the like to be amplified by means of thermionic tubes." S. Vasilach and Soc. des T[illegible]phones Picart Lebas. August 10th, 1938. (542121.)

1940

5118. "Apparatus for electrical welding." E. F. Nelson. March 19th, 1940. (542025.)

5255. "Power transmission systems." D. M. K. Marendaz and H. Bowman. March 21st, 1940. (Cognate application 8598/40.) (542026.)

7028. "Signal amplitude limiting circuits." Philco Radio & Television Corporation. May 13th, 1939. (542077.)

7097. "Train describing signalling systems." Standard Telephones & Cables, Ltd., A. Brown and A. J. Mullarkey. April 19th, 1940. (542078.)

7106. "Step-by-step switches." Philco Radio & Television Corporation. June 3rd, 1939. (542029.)

8362. "Reduction of power transformer interference in radio receivers." Philco Radio & Television Corporation. June 5th, 1939. (542130.)

8465. "Vibratory electro-magnetic motor." A. R. J. Ramsey (Chicago Flexible Shaft Co.). May 10th, 1940. (542131.)

9077. "Automatic volume control system." Philco Radio & Television Corporation. June 17th, 1939. (542030.)

9179. "Mechanism selecting circuits." Electrical Research Products, Inc. July 11th, 1939. (542081.)

10610. "Arrangements for generating oscillatory electric currents of saw-tooth wave form." Marconi's Wireless Telegraph Co., Ltd. June 30th, 1939. (542032.)

10659. "Protective or warning tiles or slabs applicable for covering underground cables and the like." E. V. Byers and H. J. Baldwin & Co., Ltd. June 21st, 1940. (542033.)

10674. "Dynamo-electric machinery." English Electric Co., Ltd., and H. S. Carnegie. June 21st, 1940. (Cognate application, 5815/41.) (542136.)

10676. "Method of adjusting a tuned earthing reactance and means for facilitating tuning." English Electric Co., Ltd., and W. E. M. Ayres. June 21st, 1940. (542137.)

10697. "Methods of terminating electrical transmission lines and circuits therefor." Baird Television, Ltd., and E. D. McConnell. June 21st, 1940. (542035.)

10748. "Telephone systems." Automatic Telephone & Electric Co., Ltd., and A. O. Pearce. June 22nd, 1940. (542039.)

10826. "Alternating-current rectifiers of the copper-oxide type." Westinghouse Brake & Signal Co., Ltd., and A. L. Williams. June 24th, 1940. (542143.)

10838. "Methods of producing nickel-iron powder." Automatic Telephone & Electric Co., Ltd., and P. N. Roseby. June 25th, 1940. (542145.)

10859. "Electrically operable number indicators." Standard Telephones & Cables, Ltd., and E. R. Myatt. June 25th, 1940. (542146.)

10860. "Super-regenerative receivers." Standard Telephones & Cables, Ltd., and W. A. Montgomery. June 25th, 1940. (542147.)

10927. "Thermionic valve circuits." Vacuum-Science Products, Ltd., and H. S. Molyneux-Ffennell. June 26th, 1940. (542151.)

11564. "Purification of nickel electrolytes." Falconbridge Nickel Mines, Ltd. September 29th, 1939. (542042.)

13510. "Grid-biasing arrangements for grid-controlled valves." General Electric Co., Ltd., and D. Midgley. August 27th, 1940. (542092.)

13555. "Electro-magnets." British Thomson-Houston Co., Ltd. August 28th, 1939. (542045.)

13620. "Railway vehicle power plants." British Thomson-Houston Co., Ltd. August 29th, 1939. (542046.)

13959. "Ignition distribution systems." C. E. Swanson. April 8th, 1940. (542095.)

13991. "Temperature indicators for turbines or other machines having rotary parts." J. Lucas, Ltd., and E. A. Watson. September 7th, 1940. (542154.)

14016. "Arrangement for the measurement of electrical impedance." British Insulated Cables, Ltd., and J. C. Quayle. September 9th, 1940. (542050.)

14125. "Temperature control devices of the thermostatic type." British Thomson-Houston Co., Ltd. September 12th, 1939. (542055.)

14246. "Small bearings." Ferranti, Ltd., J. L. Miller and A. L. Chilcot. September 16th, 1940. (Cognate application, 17129/40.) (542056.)

14405. "Electrical fuses." Midland Electric Manufacturing Co., Ltd., and A. W. Vicary. September 20th, 1940. (542059.)

14641. "Electrical circuit-breakers and switchgear of the air- or gas-blast kind." D. R. Davies and Metropolitan-Vickers Electrical Co., Ltd. September 27th, 1940. (Addition to 526429.) (542064.)

14777. "Clamping devices." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and B. G. Harrison. October 1st, 1940. (542065.)

14868. "Ignition devices for internal-combustion engines." A. L. Monger. October 4th, 1940. (542100.)

15040. "Processes for connecting a metallic to a ceramic body." British Thomson-Houston Co., Ltd. October 24th, 1939. (542101.)

15307. "Multi-position cam switches." Vapor Car Heating Co., Inc. October 19th, 1939. (542103.)

15341. "Amplitude limiting circuit arrangement." O.K.Kolb (Electrical Fono-Films Co. Aktieselskab). October 16th, 1940. (542067.)

15620. "Variable electric resistances." Sim-

monds Development Corporation, Ltd. October 24th, 1939. (542068.)

15781. "Electric-discharge devices of the cathode-ray type." British Thomson-Houston Co., Ltd. October 27th, 1939. (542104.)

15988. "Refrigerant evaporators." British Thomson-Houston Co., Ltd. November 1st, 1939. (542070.)

16047. "Electric timing circuits." British Thomson-Houston Co., Ltd., and B. G. Higgins. November 4th, 1940. (Addition to 463561.) (542107.)

16552. "Circuit arrangements for operating gaseous electric-discharge devices." British Thomson-Houston Co., Ltd. November 16th, 1939. (542113.)

17159. "Electrical networks comprising inductors having appreciable self capacity." General Electric Co., Ltd., L. I. Farren and R. S. Rivlin. December 2nd, 1940. (542161.)

17945. "Expulsion gaps for protecting electric circuits." British Thomson-Houston Co., Ltd. (Tokyo Shibaura Denki Kabushiki Kaisha). December 20th, 1940. (542118.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—NEW SOUTH WALES.—March 19th. Sydney County Council Electricity Department. Motor-driven vacuum cleaning plant, fixed type, for Bunnerong power station. Specification 570.

Belfast.—February 11th. Electricity Department. Supply of electrical materials. (January 16th.)

Bootle.—January 30th. Town Council. Electric lamps for six or twelve months (Ref. No. 14). Forms of tender from W. A. Harrison, borough electrical engineer, Town Hall.

Tottenham.—February 13th. Borough Council. Electric lamps. Schedule No. 20. Forms of tender from E. Townson, town clerk, Town Hall, London, N.15.

West Midlands. — February 3rd. Joint Electricity Authority. Grab crane and excavator at Wolverhampton generating station. (January 16th.)

Orders Placed

Australia.—P.M.G.'s DEPARTMENT.—Accepted. Braided cable, Schedule C.3266 (prices adjusted to include exchange): Contract 4626 (£9,451).—British Insulated Cables, Ltd. Contract 4267 (£2,105).—General Electric Co., Ltd. Contract 4628 (£5,332).—L.P.S. Electrical Co., Ltd. Contract 4629 (£5,161).—Liverpool Electric Cable Co., Ltd. Contract 4630 (£1,724).—Standard Telephones & Cables Pty., Ltd. Multi-coin attachments and parts, Schedule C.3185: Contract 4648 (£1,814, plus exchange).—Hall Telephone Accessories, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birkenhead.—Extensions to Capenhurst Grange (£12,500); E. M. Parkes, county architect, The Castle, Chester.

Conisborough.—Canteen, Burtoft; G. Booth & Sons.

Dukinfield.—British Restaurant and Canteen, Crescent Road; E. N. Stannion, Town Hall, Dukinfield.

Gateshead-on-Tyne.—Canteen, Team Valley Trading Estate; G. R. Smith & Partners, 3, Winchester Street, South Shields.

Rebuilding and re-conditioning warehouse for Binns, Ltd.; J. Milne & Sons, Ltd., Coatsworth Road, Gateshead.

Twenty or thirty houses for aged people; Council of Social Service, 1, Gladstone Terrace, Gateshead.

Higham Ferrers.—Town Hall (£10,000); Prof. Richardson, R.A., Ampthill.

Holyhead.—British Restaurant at Railway Temperance Institute; R. E. Price, surveyor, Town Hall, Holyhead, Anglesey.

Horton Grange.—Pithead canteen for Choppington Collieries, Ltd., Guide Post, Bedlington.

Keighley.—British Restaurants at Wesley Place and at Spencer Street; E. G. Felgate, borough architect, College Street.

Lancashire.—Electric lighting in school air-raid shelters at Litherland and Urmston; A. Evans, county architect, County Offices, Preston.

Leeds.—Adaptation of premises, Stanningley, for community cooking depot; W. S. Cameron, city engineer, Civic Hall.

Liverpool.—Gymnasium at College, Shaw Street, Anfield (£3,500); L. H. Keay, city architect, Blackburn Chambers, Dale Street.

Loftus.—Conversion of garage into British Restaurant; U.D.C. surveyor.

Millom (Cumberland). — Adaptation of St. George's Hall as restaurant; R.D.C. surveyor.

Sheffield.—Business premises, Fulwood Road; Commercial Assurance Co., Ltd., 2, East Parade.

Sunderland.—Canteen and store for R. W. Collins; Matkin & Hawkins, architects, Fawcett Street.

Shelter improvements, including heating (£4,500); C. Emmerson, surveyor, R.D.C. offices, The Esplanade, Sunderland.

Urmston.—Dairy, store, etc., Trafford Park; F. Hills & Sons, Ltd.